DEVOTED TO
TEXTILE CHEMISTRY
AND
WET-PROCESSING
BLEACHING
DYEING
PRINTING
FINISHING

JUNE 13, 1949
VOLUME 38, No. 12

AMERICAN DYESTUFF REPORTER

OFFICIAL PUBLICATION
of the
PROCEEDINGS
AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
AND COLORISTS

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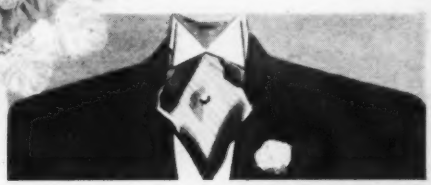

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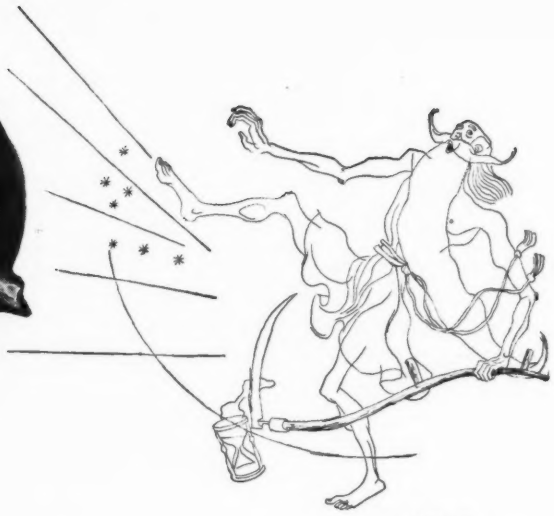
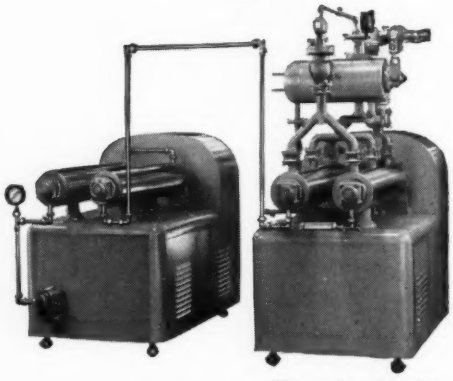
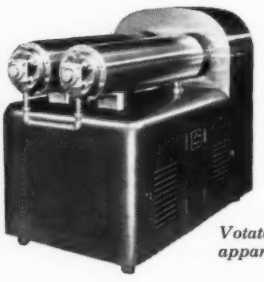
• Eastman Acetate Dyestuffs are sold in the United States through Tennessee Eastman Corporation in Kingsport, Tennessee, and Lodi, N. J.; in Canada, through Clough Dyestuff Company Ltd., 33 St. Mathieu Street, St. Laurent, Quebec.



IT PAYS to kick out the kettle on your STARCH COOKING jobs!



Votator heat transfer apparatus for starch paste



Votator heat transfer apparatus for backfill

For centuries, kettle cooking methods have served mankind well enough. This is the case no longer when it comes to modern, large-scale textile starch cooking problems—and the important business of keeping costs in line with profits.

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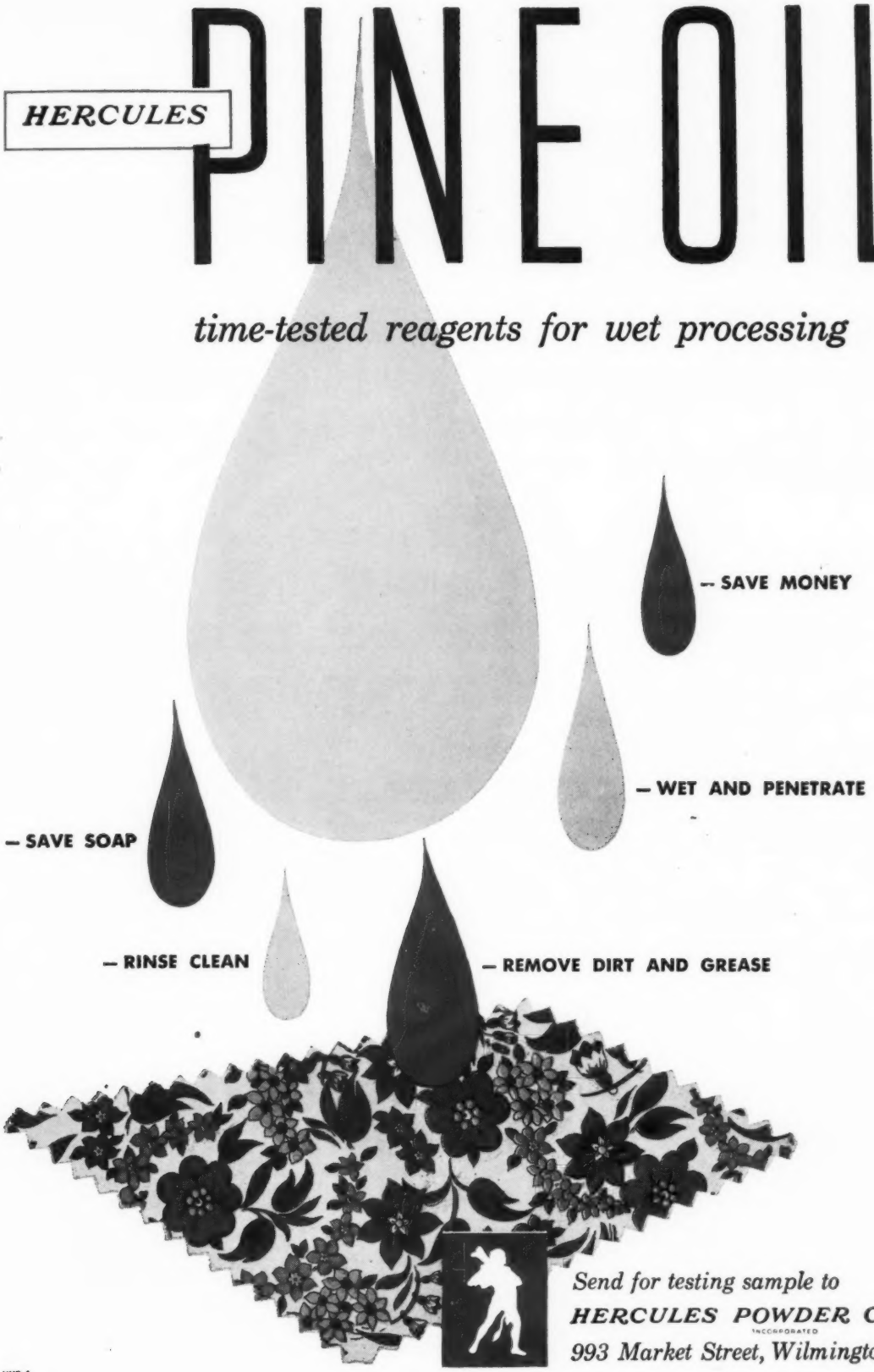

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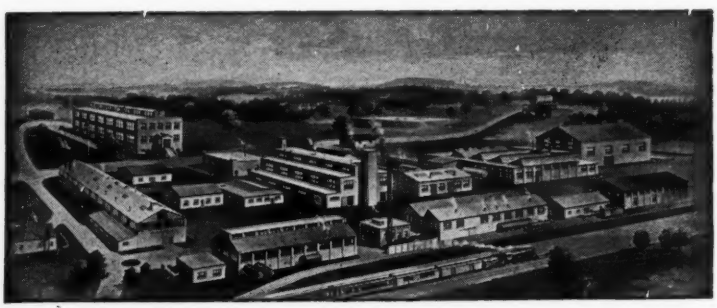

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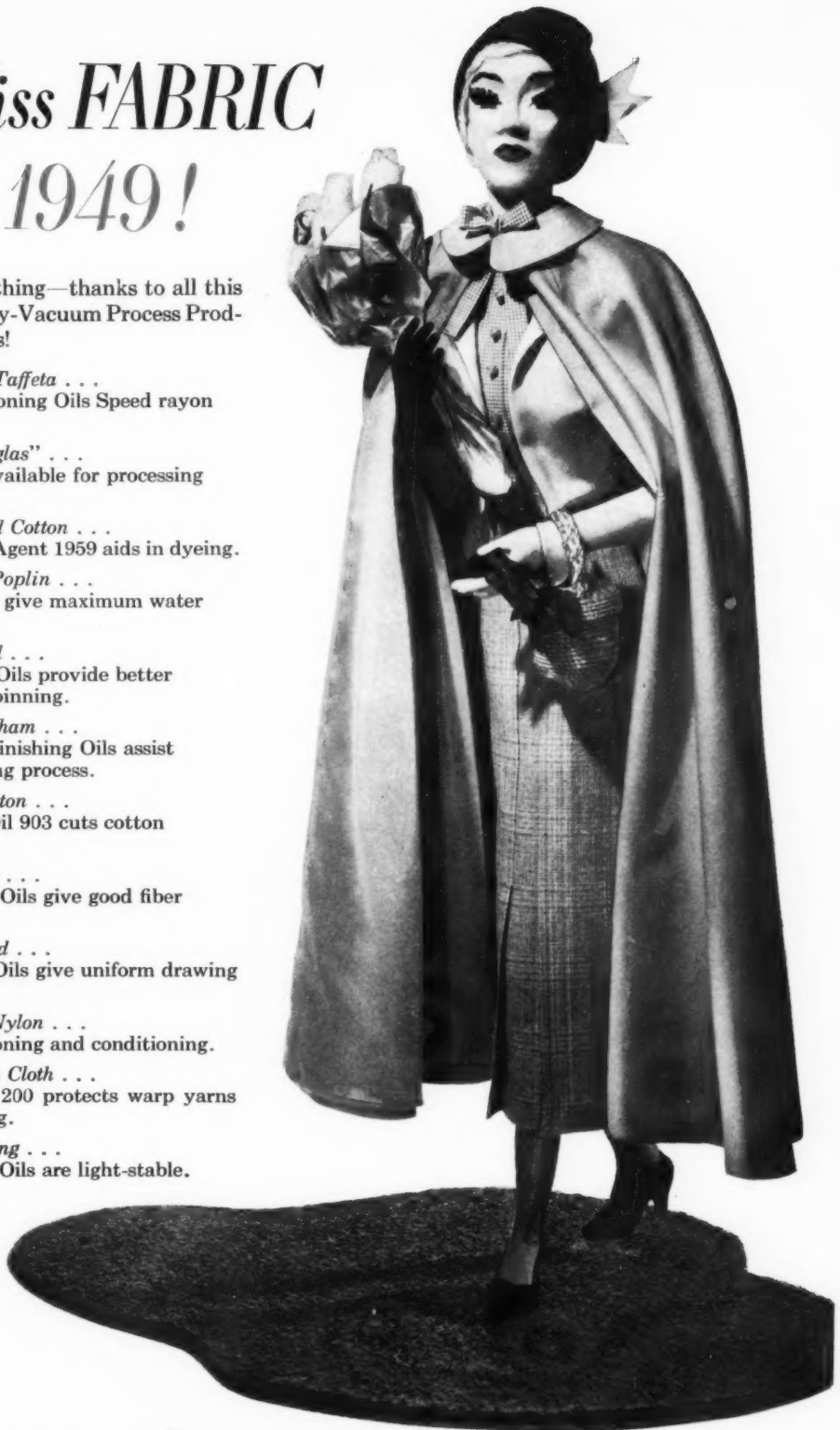

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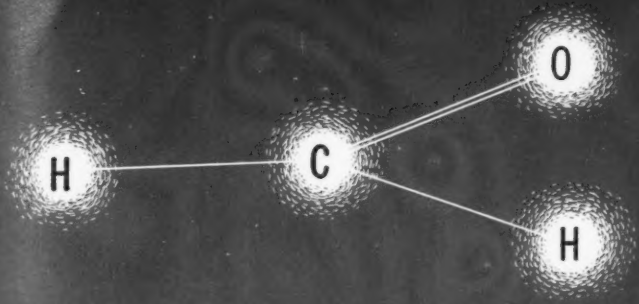

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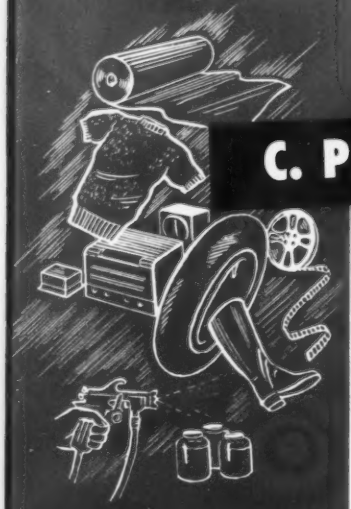

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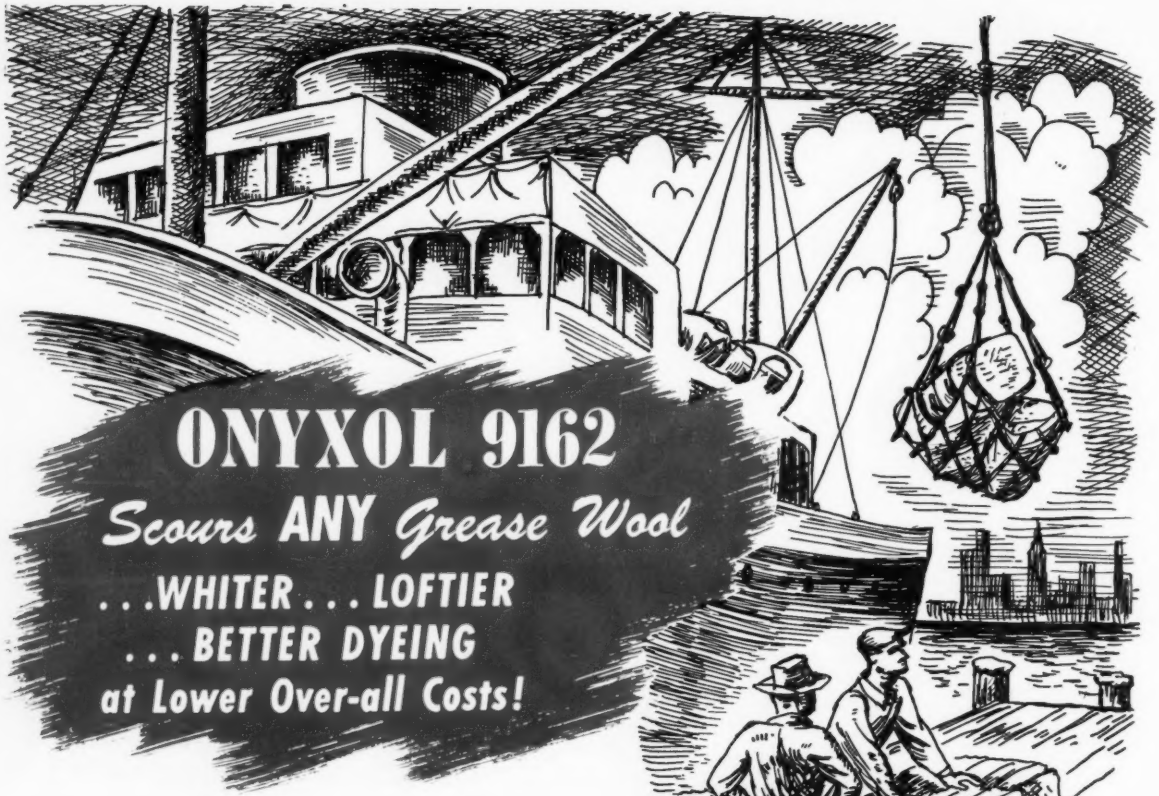

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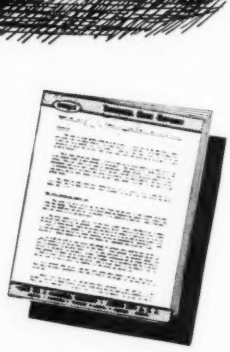

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ARMOUR Chemical Division

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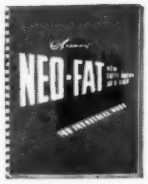

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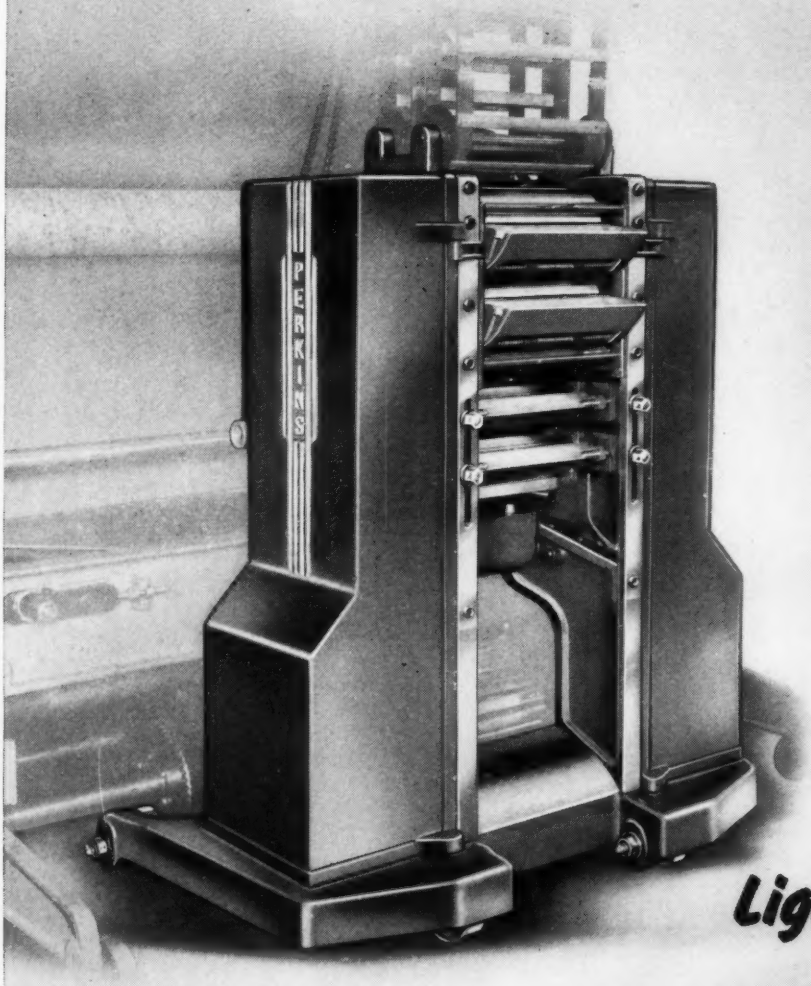
PERKINS Fiber Conditioner



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- ***Lighter weight***

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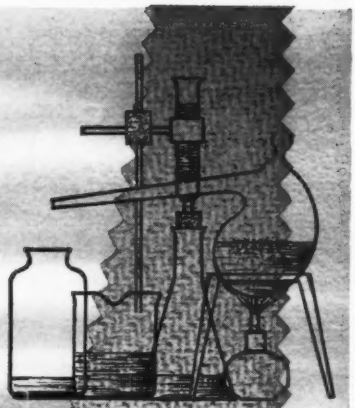

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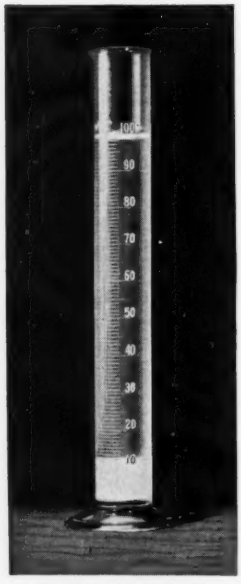
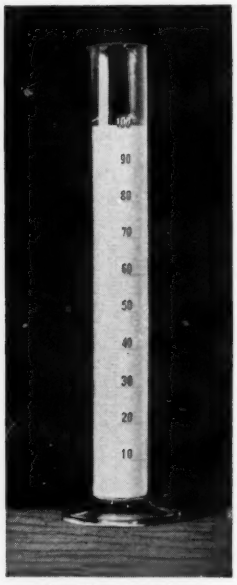


Blanc Fixe after 30 minutes — no dispersing agent



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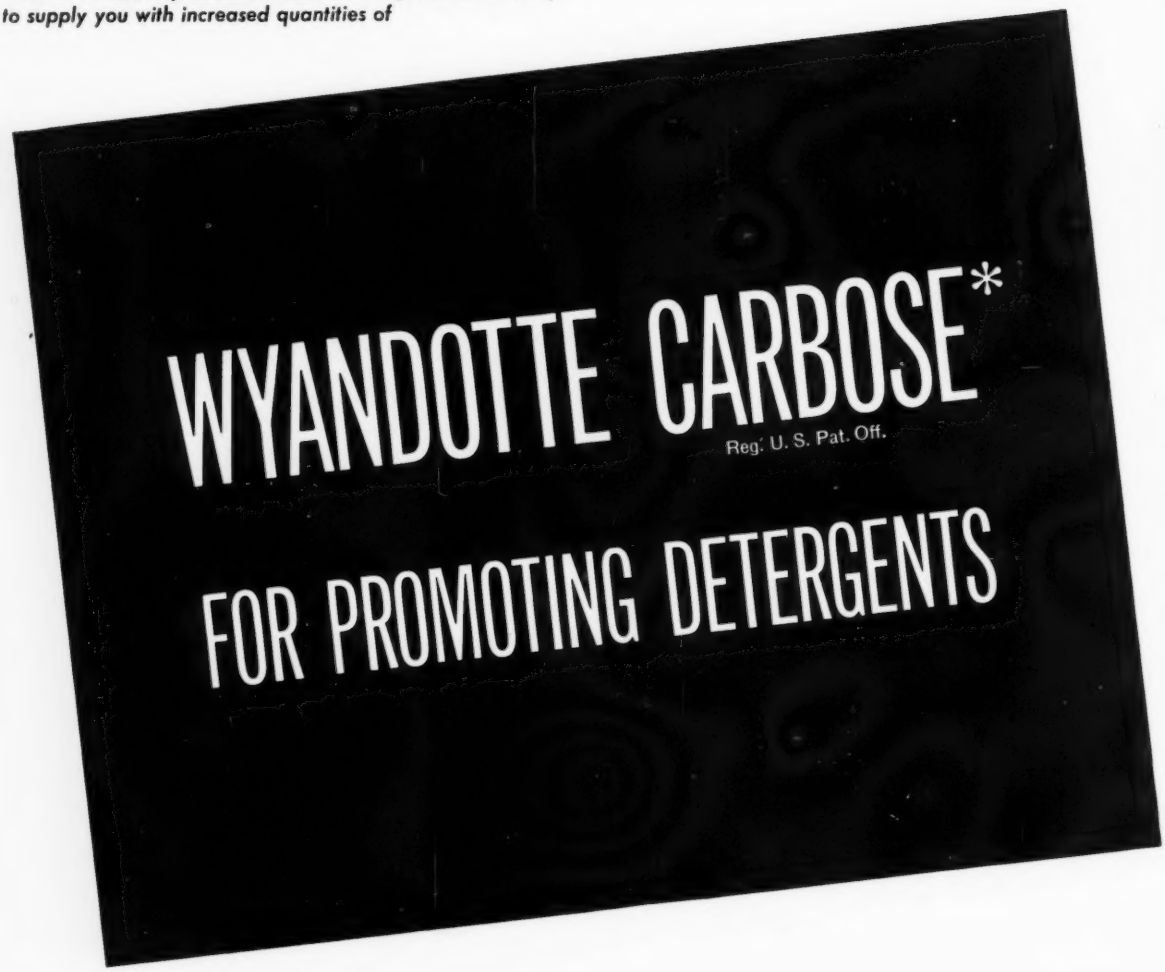

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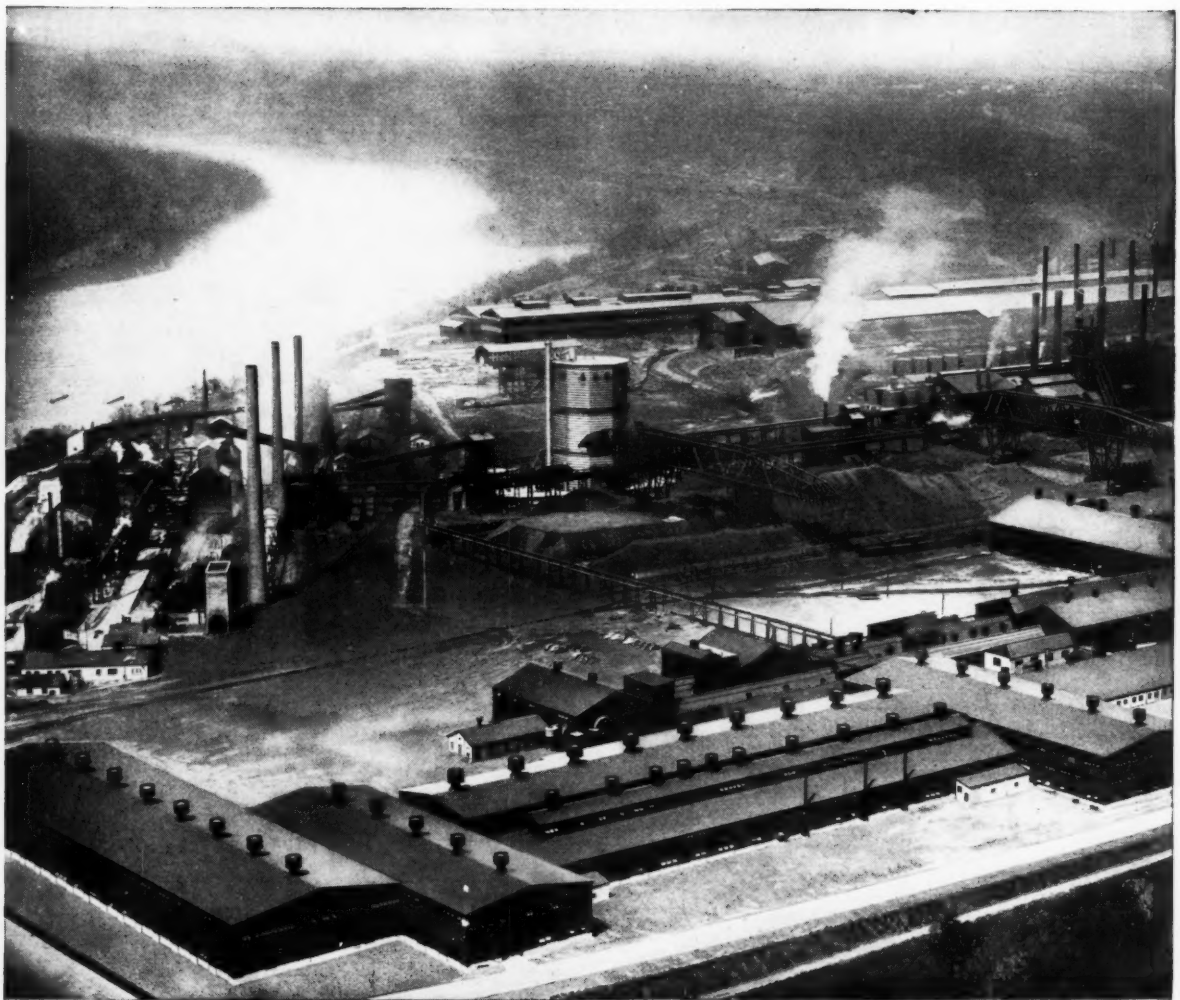

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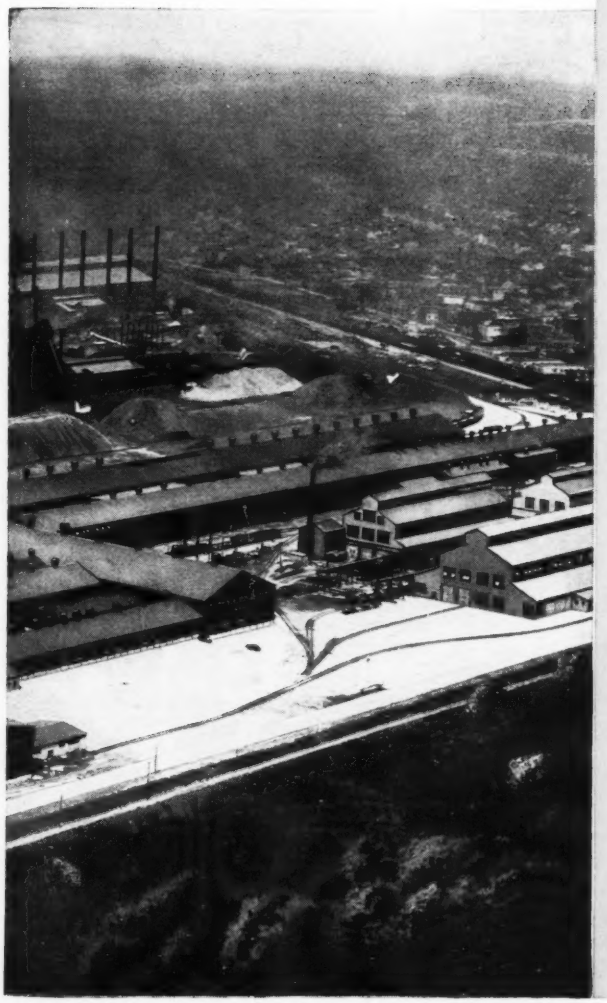

When a *master* mechanic gets new tools, expect master workmanship. And when CRUCIBLE, *master* producer of tool, alloy and specialty steels, designs an $18,000,000 mill specifically for hot and cold rolled stainless sheet and strip, you can rightly expect the best that modern facilities and generations of *specialty product* leadership can provide.

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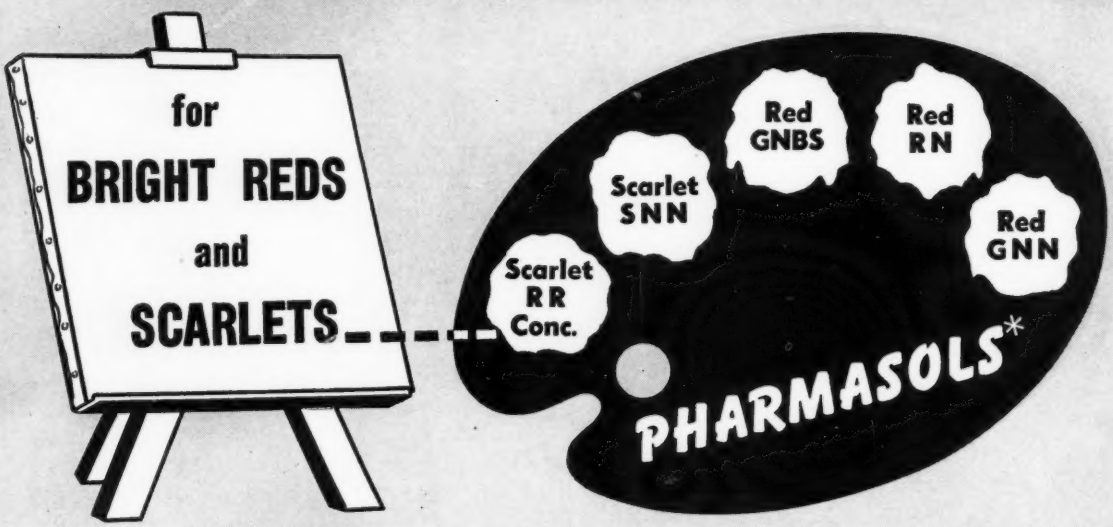

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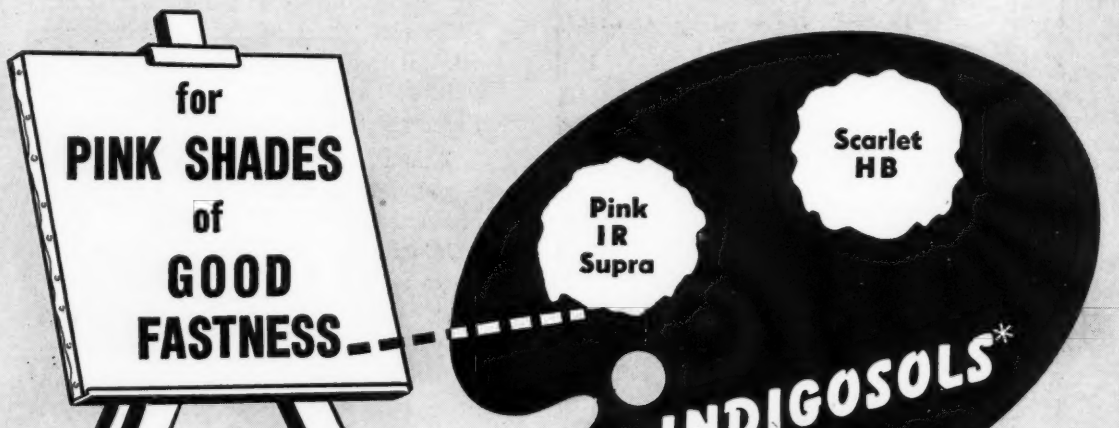

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Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

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JUNE 13, 1949

VOLUME 38 NUMBER 12

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VOLUME 38 JUNE 13, 1949 NUMBER 12

THE BONDED FABRIC INDUSTRY*

RAYMOND B. SEYMOUR
The Atlas Mineral Products Company, Mertztown, Pennsylvania

TODAY when one may view four-page trade-journal advertisements on bonded fabrics and read newspapers printed on this material, it would be redundant to say "yes bonded fabrics are here to stay". Actually, this new industry is healthy and getting along as well as can be expected in an era of soft goods recession.

It is difficult to define the bonded fabric industry since in its many ramifications it produces materials covering the range between paper and textiles. Actually, some of the improvements in the felt and wadding fields have resulted in some of these old line products being classed under the name bonded fabric.

A critical study of the wadding art *(22, 32, 45)* indicates that almost a century ago, this industry had available many of the general techniques now used to produce bonded fabrics. Of course, the old wadding industry lacked many of the mechanical and chemical processing tecnniques now available—but so did the entire textile industry.

It must also be admitted that the bonded fiber industry has not experienced the rapid growth that might be expected. The use of adhesives to bond the fibers in a web *(33)* and much of the basic art *(49, 50)* has been patented for at least 25 years but customer acceptance has developed slowly. In recent years, a few bonded fabric plants have operated at a profit but many are still being subsidized.

One of the obstacles to its growth has been the close relationship of the producers of bonded fabrics with the paper and textile industries. Most plants were in competition with parent companies producing old line textiles or paper. As a result, the new industry received more criticism than encouragement from the stockholders who talked progress but feared the consequences which might result from a sincere exploitation of bonded fabrics in competition with the regular line.

The recent growth of the bonded fabric industry may be attributed in part to the efforts of producers of raw material who were seeking new outlets for their products. In their attempts to promote the use of rayon and cotton fibers, the raw material suppliers became so enthusiastic that some of them set up pilot plants to demonstrate manufacturing techniques. These suppliers stressed functional uses of bonded fabrics and it is significant to note that the four-page advertisements that have recently appeared do not even mention disposable products but do emphasize the use of these products in plastic laminates.

The general methods of manufacture which have been fairly completely described *(57)*, vary in accordance with the type of machinery used. Paper machinery operates at speeds of at least 300 feet per minute and produces a wider web which is satisfactory for tea bags but such products do not have the draping qualities required for textile applications.

Considerable sums of money have been invested in the development of machinery which would produce a sheet or lap of felt or fiber having random orientation. The textile industry which has been geared to think in terms of fiber alignment in the carding operation subsidized the development of aerodynamic doffing and condensing *(11, 12, 25)* but many of the principles used appear to be related to older art *(3)*.

Some orientation takes place as the web is formed on paper machinery but if paper had the alignment found in a carded web, the paper industry would never have grown to its present size. Although orientation of fibers was formerly stressed *(36)*, engineers that have learned how to obtain random distribution of fibers have been quick to realize its advantage. Actually, the process is much less complicated that one may be led to believe.

The rate of production on textile machinery is much lower than on paper machinery although jute and wool cards can produce much wider webs than the cotton system. The latter may be operated at much faster rates (65 lbs. per hour) than is the custom in the textile industry and good production can be obtained by using a series of cards in a line and transferring the webs from the doffers to a common conveyor.

Considerable emphasis has been placed on techniques for cross-laying the card web but the basic idea *(20)* like so many others in the bonded fabric industry was patented many years ago.

Random orientation of fibers can also be secured by the use of a garnett in conjunction with a conventional lapper. The degree of orientation will be a function of the relative speeds of the lappers.

Cotton has been the most widely used primary fiber in the web but more and more viscose rayon is being used because of its longer fiber length. Improvements in felt have been made by adaptation of bonded fabric techniques *(4)* and these techniques have also been applied to the precessing of asbestos *(40)*. According to Boeddinghaus *(5, 6)* wool, hair, and jute may also be used. Similar techniques are used in the manufacture of glass fiber bats *(59)*.

There are three general methods for bonding the fibers after laying the web *(2)*, viz., chemical action, application of extraneous adhesives and bonding of thermoplastic fibers with the primary fiber to form a lap.

* Presented to the Senior Seminar, Philadelphia Textile Institute, April 5, 1949.

Adhesion of the cellulosic fibers in a web may be brought about by superficial treatment with zinc chloride, sulfuric acid *(35)*, or sodium hydroxide but only one commercial product is known to be produced by this technique.

The adhesive may be added as a melt, solution, or emulsion using conventional or special equipment. In one of the commercial processes, the binder is printed on the web in various patterns by means of an intaglio or embossed roll *(14, 15, 34, 37, 51, 62)*. Eustis has sprayed phenolic and urea resins on the web in the form of a non-foraminous layer *(23, 24)* and Jackson has simply dusted asphalt on the web *(41)*. One of the leading producers of bonded fabrics uses the intaglio roll-printing technique with a wavy line or cross-type pattern which produces a product with a decorative effect.

The application of solutions of plastics as a binder for the fibers in the web by use of multiple apertures *(58)*, impregnation baths, or modified padders is the subject of many patents. Aqueous solutions of methyl cellulose, polymethacrylic acid, carboxymethyl cellulose, hydroxyethyl cellulose *(18)*, polyvinyl methyl ether, maleic anhydride copolymers, and polyvinyl alcohol *(16, 17, 55)*, have been used as binders, the latter being used for the manufacture of milk filters. The older art includes starch, casein and glue *(53)*. In general, bonded fabrics produced by the use of aqueous solutions lack resistance to hot water although this deficiency may be overcome in part by the addition of insolubilizing agents. For example, Schwartz has added alkali metal salts to solutions of polyvinyl alcohol *(56)*.

Freshly compounded or prevulcanized natural rubber latex has been used *(38, 44, 54)* and of course, the impregnation of tire cord borders closely on this art. As might have been expected, practically all the commercially available aqueous polymeric emulsions have been investigated. Because of the economics involved, polyvinyl acetate *(61)*, is widely used as a binder in commercial processes for the manufacture of bonded fabrics. Copolymers of vinyl chloride, polystyrene and polymethyl acrylate have been used experimentally and the copolymer of styrene with minor proportions of butadiene is used commercially. The older art of the manufacture of stiff cloth included the use of solutions of rubber and resins and some of these techniques have been adopted by the bonded fiber industry. There are many patents on the use of lacquers such as rubber cement *(39)*, acetone solutions of polyvinyl acetate *(29)*, and xylene solutions of polyvinyl butyral *(13)*, but these techniques yield water repellent surfaces and are too hazardous to be adopted by the textile industry.

Aqueous solutions of potentially infusible products such as condensates of formaldehyde with phenol, urea, and melamine have been used but a water repellent and boardy surface is usually obtained. Viscose solutions are being used commercially to cement cellulose fibers *(10)* using techniques akin to those used in the manufacture of cellophane. Cellulosic solutions in cupra ammonia *(19)*, sodium zincate, zinc chloride and quaternary ammonium chloride have been used experimentally and since the resultant webs are completely cellulosic in character, they are unaffected by hot water or solvents. Care must be taken in the folding of these products since heavy creases will cause a breaking of the fibers.

The technique, using a blend of cellulosic and thermoplastic fibers to form a web which is later subjected to heat, is related to the molding of reinforced plastics but the ratio of plastics and fibers in the two processes differs greatly. The thermoplastic fiber may be plasticized cellulose acetate *(7, 52)*, vinyl chloride-vinyl acetate copolymers *(28)* or polyvinyl acetate *(26)* but almost any heat softenable fiber (including nylon) may be used *(27)*. When cellulose acetate is the thermoplastic fiber it may be regenerated to cellulose in the finished web *(46, 47)*.

Regardless of the methods used for laying the web and cementing the fibers, the final step in all processes requires heat to remove any solvent that may be present and to soften or cure the admixed materials. The drying may be accomplished in conventional single or multiple pass ovens or on heated rolls or cans *(1, 43)*.

Until recently, most of the bonded fabric products were used for expendable items such as towels, tape, diapers, wiping cloths, clothing and casket linings, napkins, and disposable sheets. But industry is now aware of the potentials presented by more functional uses where the real superiority of bonded fabrics can be demonstrated or where different types of products can be developed for specific application.

There is a great deal of activity in the investigation of the use of bonded fabrics for window shades, oilcloth, wallpaper, adhesive tape, linoleum, artificial leather, and other products in which the bonded fabric serves as the base material. Because of the lack of standard tests, it has been difficult to show the advantages of bonded fabrics in these applications but this handicap does not exist in the field of plastic laminates where, in contrast to laminates from woven cloth, the strength can be distributed uniformly in all directions.

TABLE I
Physical Properties of Plastic Laminates

	Tensile Strength (psi)	Flexural Strength (psi)	Hardness (Rockwell M)	Water Absorption %	Impact Resistance (psi)	Impact Flexural Strength (psi)
16.2 oz. cotton duck	6200	8100	32	5.9	1000	19,700
3.8 oz. cotton sheeting	10200	19100	61	3.6	1790	38,500
2.0 oz. cotton sheeting	8400	13700	53	9.1	1340	26,200
Steralon 50:50	8200	10700	107	2.8	610	20,300
Steralon Viscose Rayon	6400	10200	116	2.2	....	.....
Steralon Viscose Rayon Delustered	5900	8400	116	2.8	270	17,600
Viskon Cotton	6700	13200	48	6.0	433	16,900
Viskon Rayon	5600	10400	73	6.7	490	17,700

Plastic laminates using bonded fabrics as the reinforcing member *(30, 31, 60)* may be machined with ease and possess good impact resistance, particularly when the blow is delivered in a diagonal direction. Several commercially available bonded fabrics are compatible with polymerizable polyester resins and yield strong laminates as is demonstrated by the data in Table I in which low pressure polyester laminates prepared from cotton duck, Steralon and Viskon are compared.

The cotton duck weighed 16.2 oz. per sq. yd. and had 46 and 31 ends per inch in the warp and filling respectively. The cotton sheeting weighing 3.8 oz. per sq. yd. had 56 ends per inch in the warp and filling respectively. Cotton sheeting weighing 2.0 oz. per sq. yd. had 38 ends per inch in the warp and filling respectively.

The Steralon used was a commercially available bonded fabric manufactured by the impregnation of a randomly oriented garnetted web with a patented thermosetting plastic. The material designated as 50:50 was made by blending 50 parts of viscose rayon and 50 parts of cotton.

The Viskon used was a commercially available bonded fabric evidently prepared by the impregnation of a carded web of cotton fibers or rayon fibers with a solution of viscose.

In all cases, the fabrics were impregnated with Thalid 88087 B (a commercially available unsaturated polyester resin) containing 1% benzoyl peroxide and the impregnated sheets were laid up and cured in a Carver Laboratory Press for 30 minutes at 115°C. and 35 psi.

With the exception of impact resistance, all physical tests were made according to ASTM methods. Impact data were ob-

(Concluded on Page 480)

EFFECT OF VARIOUS SURFACE-ACTIVE AGENTS ON THE PENETRATING POWER AND STABILITY OF CALCIUM HYPOCHLORITE AND BLEACHING POWDER SOLUTIONS

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SOME time ago this Laboratory became interested in the problem of increasing the penetrating power of concentrated solutions of bleaching powder and calcium hypochlorite. It seemed probable that this could be accomplished by the addition of a suitable surface active agent but the hypochlorites are strong oxidizing agents and there was no information available in the literature to guide us in the selection of a penetrant whose surface activity would not be destroyed. It was necessary, therefore, to test a large number of surface active agents and some very interesting results were obtained. Since both bleaching powder and calcium hypochlorite are potentially useful as oxidizing agents in organic synthesis and in sanitation, weed-killing and textile processing, publication of our data was thought worth while even though several years have elapsed since the work was done.

The surface-active agents tested were those which were considered most likely to be suitable for the purpose. There were 130 different products in all, submitted by 32 manufacturers. All the products tested are listed in Table I, each with a parenthetical symbol which designates the manufacturer. The names of the manufacturers corresponding to the symbols are given in Table II.

We determined the "calcium stability values" of all these agents by a modified Hart method *(5)*, but these values were of no use in the selection of good penetrants for hypochlorite solutions.

The lowering of the surface tension in each case was determined with a Cenco-du Nouy tensiometer, but these data were of limited value. All hypochlorite solutions with good penetrating properties had surface tensions less than about 50 dynes/cm. but not all the agents which brought the surface tension below that value proved to be good penetrants (see Tables V and VI). The canvas disk method *(4)* was tried for measuring the penetrating power of the solutions, but it could not be used because of the high density of the solutions.

The test for penetrating power on which our conclusions are based is the Draves-Clarkson test, which has been adopted by the American Association of Textile Chemists and Colorists as the official method *(2)*. In this test a 5-gram skein of gray, unboiled cotton yarn with a metal hook and sinker attached to one end, is immersed in the test solution in a glass cylinder of suitable size. The skein tends to float

TABLE I

Surface-Active Agents Tested[a]
(Symbol in Parenthesis Indicates Manufacturer. See Table II)

Acid Soluble Soap R148 (CS)
Aerosol AS (ACC)
Aerosol AY (ACC)
Aerosol MA (ACC)
Aerosol OS (ACC)
Aerosol OT 10% (ACC)
Albatex PO (C)
Alkanol S (duP)
Alkanol SA (duP)
Alkanol WXN (duP)
Ammonium Hexaphosphate Dinitride (V)
Aquanol SO (B)
Arctic Syntex A Powder (CPP)
Arctic Syntex M Beads (CPP)
Arctic Syntex M Liquid (CPP)
Arctic Syntex T Powder (CPP)
Arylene (HP)
Cation Active Compound C (V)
Cation Active Compound D (V)
Cerfak G (H)
Charlab Detergent 47-0 (CCL)
Chemicharl (CCL)
Cominol (COM)
Daxad No. 11 (DA)
Daxad No. 23 (DA)
Detanol (COM)
Dianol D (O)
Duponol ME Dry (duP)
Duponol PC (duP)
Duponol WA Flakes (duP)
Dypenol SE (HP)
Emulgor A (G)
Gardinol LS Paste (PG)
Gardinol LS Powder (PG)
Gardinol WA Paste (PG)
Gardinol WA Powder (PG)
Hytergen BM (HP)
Intramine WK (SYN)
Intramine Y (SYN)
Invadine B (C)
Invadine C (C)
Invadine N (C)
Janusol (SYN)
Lamepon A (CM)
Lamepon 4C (CM)
Lanitol AC (ARK)
Lightning Penetrator X (COM)
Mercerol (SCW)
Modinal D Paste (PG)
Modinal ES Paste (PG)
Mulsor 3CW (SYN)
N-25 (H)
N.S.A.E. Paste (O)
Nacconol NR Flake (NAC)
Nacconol NRNO Flake (NAC)
Nacconol NRSF Flake (NAC)
Naccosol A (NAC)
Nopco 41-5-93B (NOP)
Nopco 1067 (NOP)
Nopco 1067 D (NOP)
Nopco 1067 X (NOP)
Nopco DID (NOP)
Nopco VOL (NOP)
Novonacco (NAC)
Oil TI-522-25 (N)
Oleo Glyceryl Sulfate C (O)
Oranap (W)
Orvus (PG)
Orvus ES Paste (PG)
Penatrol 60 (B)
Penequik BT (SS)
Penesolve (SS)
Penetralene BM (SS)
Penetrator 394A (LS)
Penetrolin AC (ARK)
Phi-Φ-Sol WA (O)
Pineol (ARK)
Product BC (duP)
Pro-so-tex No. 55 (Q)
Pro-so-tex No. 58 (Q)
Protex Gel (C)
Quaker No. 3X (Q)
Quaker No. 700X (Q)
Quix (N)
Quixite (N)
Resolin B Paste (SCW)
Sandocarnit (SCW)
Sandopan A Special (SCW)
Sandozol N (SCW)
Santol No. 1 (CCL)
Santol T (CCL)
Santomerse D (M)
Santomerse No. 1 (M)
Santomerse No. 2 (M)
Santomerse No. 3 (M)
Solvadine AL (C)
Solvadine NC Conc. (C)
SP-302 (S)
SP-702 (S)
SP-703 (S)
Sulfamine 1510 (SS)
Sulfatate (G)
Sulphonated Lauralene C-75 (N)
Supergel TB (LS)
Supersulfate FS Powder (LS)
Surfax WO (H)
Tensol No. 5Z (SYN)
Tergavon C (C)
Tergitol O8 (CC)
Tergitol 4 (CC)
Tergitol 4T (CC)
Tergitol 7 (CC)
Tetranol No. 1638 (ARK)
Triton NE (RH)
Triton 720 (RH)
Triton E-40 (RH)
Triton K-60 (RH)
Triton W-30 (RH)
Ultravon W (C)
Ultrawet D-4 (AT)
Ultrawet 40 (AT)
Unitex (COM)
Victor STPP (V)
Warcosol 897 (WC)
Warcosol Paste (WC)
Wetsit Single (W)
Wetting Agent No. 35-B (V)
Wetting Agent No. 58-B (V)
Wetting Agent 21529 (CS)
Xynomine No. 33 Powder (O)

[a] The use of a brand name in this publication is not to be construed as a recommendation by the U. S. Department of Agriculture of that particular product over others of the same chemical constitution sold under other trade names. For information about the chemical constitution of these products see list compiled by F. J. Van Antwerpen, Ind. Eng. Chem. *33*, 16-22, 740 (1941).

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TABLE II

Symbols Used to Indicate Manufacturer[a]

ACC	=	American Cyanamid and Chemical Corporation
ARK	=	Arkansas Company, Inc.
AT	=	Atlantic Refining Company
B	=	Beacon Company
C	=	Ciba Co., Inc.
CC	=	Carbide and Carbon Chemicals Corp.
CCL	=	Charlotte Chemical Laboratories, Inc.
CM	=	Chemical Marketing Co., Inc.
COM	=	Commonwealth Color and Chemical Company
CPP	=	Colgate-Palmolive-Peet Company
CS	=	Commercial Solvents Corporation
DA	=	Dewey and Almy Chemical Company
duP	=	E. I. duPont deNemours and Company
G	=	Glyco Products Co., Inc.
H	=	E. F. Houghton and Company
HP	=	Hart Products Corporation
LS	=	Laurel Soap Manufacturing Company, Inc.
M	=	Monsanto Chemical Company
N	=	Napthole, Inc.
NAC	=	National Aniline and Chemical Company
NOP	=	National Oil Products Company
O	=	Onyx Oil and Chemical Company
PG	=	Procter and Gamble Company
Q	=	Quaker Chemical Products Corporation
RH	=	Röhm and Haas Company
S	=	Stanco, Inc.
SCW	=	Sandoz Chemical Works, Inc.
SS	=	L. Sonneborn Sons, Inc.
SYN	=	Synthetic Chemicals, Inc.
V	=	Victor Chemical Works
W	=	Jacques Wolf and Company
WC	=	Warwick Chemical Company

[a] The inclusion of a manufacturer's name in this list is not to be construed as a recommendation by the U. S. Department of Agriculture of that particular firm over others in the same field.

TABLE III

Solubility of Commercial Calcium Hypochlorite[a]

Weight of sample stirred with 100 grams of H_2O	*Weight of insoluble residue[c]*	*Analysis of filtrate[b]*	
		Concn. of OCl^- (approx.)	*Concn. of Ca^{++} (approx.)*
grams	grams	%	%
10	0.9	4.6	—
15	1.7	6.5	—
20	2.2	8.2	—
25	4.0	9.6	3.8
30	7.0	11.4	—
35	6.0	12.4	—
37.5	7.0	12.7	5.0
40	9.5	12.2	—
50	32.0	11.8	—
70	71.0	9.2	3.5
100	114.0	7.6	—

[a] Analysis: Ca, 23.28%; Cl as hypochlorite, 34.94%; Cl as chloride, 8.06%; Cl as chlorate, 0.12%; pH of 1% solution, 11.6.

[b] For determination of OCl^-, see Reference 3; Ca^{++} was determined by oxalate-permanganate method.

[c] The apparent discrepancies between weight of sample, weight of insoluble residue and concentration of hypochlorite ion in the filtrate result from retention of water by the precipitate.

TABLE IV

Solubility of Bleaching Powder[a]

Weight of sample stirred with 100 grams of H_2O	*Weight of insoluble residue[c]*	*Analysis of filtrate[b]*	
		Concn. of OCl^- (approx.)	*Concn. of Ca^{++} (approx.)*
grams	*grams*	%	%
25	13	3.7	3.4
30	16	4.0	—
35	26	4.0	4.5
40	39	4.0	4.8
45	44	3.8	—
50	46	3.4	4.7
60	70	3.6	5.8
70	71	3.0	5.8
100	110	3.0	7.3
110	115	3.4	7.8

[a] Analysis: Ca, 33.13%; Cl as hypochlorite, 15.02%; Cl as chloride, 16.09%; Cl as chlorate, 0.15%; pH of 1% solution, 12.3.

[b] For determination of OCl^-, see Reference 1; Ca^{++} was determined by oxalate-permanganate method.

[c] The apparent discrepancies between weight of sample, weight of insoluble residue and concentration of hypochlorite ion in the filtrate result from retention of water by the precipitate.

in a vertical position until wet, and the more effective the penetrant, the shorter the time required to wet and sink the skein. For our purposes a solution in which a skein did not sink in less than 1800 seconds was considered to have no penetrant action.

For this test, it was necessary to have clear solutions and it was also thought desirable to make the tests on solutions of maximum oxidizing power. For these reasons solubility data were obtained as follows: Various quantities of bleaching powder or commercial calcium hypochlorite were mixed with 100 grams of water and stirred mechanically for one hour. The undissolved solid was then filtered off, and the concentration of hypochlorite ion in the filtrate was determined. For bleaching powder, the A.O.A.C. method (1) was most satisfactory, but for commercial calcium hypochlorite a method in which an excess of potassium iodide is added and the liberated iodine titrated with 0.1 N arsenious oxide proved more suitable *(3)*.

On the basis of the results of these experiments (Tables III and IV), the test solutions were prepared as follows:

CALCIUM HYPOCHLORITE TEST SOLUTION.—This solution was prepared by adding 27 parts by weight of commercial calcium hypochlorite to a solution of 1 part of surface-active agent in 72 parts of water. This mixture was stirred mechanically for one hour and filtered by suction for one hour more. The quantity of surface-active agent used was thus equal to 1% of the total weight of the three ingredients, and the calcium hypochlorite and water were in the ratio known to give a filtrate of maximum hypochlorite content (approximately 12.7% OCl^-). In a few cases tests were also made with 0.5, 2 or 3% of surface-active agent present.

BLEACHING POWDER TEST SOLUTION.—This solution was prepared by adding 23 parts by weight of bleaching powder to a solution of 1 part of surface-active agent in 76 parts of water. Subsequent treatment was exactly as described in the preceding paragraph. (Concentration, approximately 4% OCl^-). Solutions containing 0.5, 2, and 3%, respectively, of surface-active agent were also tested in some cases.

In order to determine the stability of the surface-active agents, each solution was tested three times, first, immediately after filtration, again 3 hours later, and finally 21 hours after filtration. The results are given in Tables V and VI.

During the tests of calcium hypochlorite solutions for penetrant action, it frequently happened that the skein was violently attacked after about five or more minutes of the test period. This occurred both in freshly filtered solutions and in solutions which had been standing for three or twenty-one hours after the initial test, in which they had shown good penetration. It also happened when no surface-active agent was present. The value of the tests was not affected, because any agent which did not sink the skein in calcium hypochlorite solution in less than five minutes was considered a poor penetrant. Bleaching powder solutions showed little if any tendency to attack the skeins.

In order to determine the effect of surface-active agents on the rate of disappearance of hypochlorite ion, two stock solutions were prepared by mixing (a) 27 parts of commercial caicium hypochlorite with 72 parts of water, and (b) 23 parts of bleaching powder with 76 parts of water. After filtration these stock solutions were divided into portions, and to each was added 1% of one of the five surface-active agents previously shown to be the best penetrants. The concentration of hypochlorite ion in each and in suitable control solutions was determined (1, 3) at intervals during a period of 120 hours. The results of these determinations are shown graphically in Figure 1. From these curves it can be seen that the

TABLE V

Properties of Surface-Active Agent—Calcium Hypochlorite Solutions of Maximum Oxidizing Power (Approximate OCl^- concentration, 12.7%)

Surface-Active Agent (in order of effectiveness)	Concn.	Surface tension	Time required to sink skein (6-gram hook used)		
			Immediately after filtration[a]	3 hours after filtration	21 hours after filtration
	%	dynes/cm.	seconds	seconds	seconds
Tergitol O8 (CC)	1	27.3	sank instantly	sank instantly	sank instantly
Tergitol O8 (CC)	0.5	29.6	sank instantly	sank instantly	sank instantly
Gardinol LS Paste (PG)	2	29.3	29	36	54
Gardinol LS Paste (PG)	1	40.1	79	108	192
Ultrawet D-4 (AT)	3	33.9	4	9	>1800
Ultrawet D-4 (AT)	2	33.5	9	49	*
Sulfatate (G)	2	33.3	13	69	*
Triton NE (RH)	1	30.0	33	122	*
Product BC (duP)	1	32.2	57	92	*
Sulfatate (G)	1	33.7	78	208	*
Alkanol S (duP)	1	45.8	93	85	>1800
Alkanol S (duP)	2	44.8	15	[b]	—
Naccosol A (NAC)	1	35.4	104	*	—
Ultrawet D-4 (AT)	1	36.1	167	*	—
Ultrawet 40 (AT)	1	36.1	175	*	—
Naccosol A (NAC)	2	35.4	*	—	—
Arylene (HP)	1	35.5	*	—	—
Invadine N (C)	1	36.9	*	—	—
Emulgor A (G)	1	37.7	*	—	—
Tensol No. 5Z (SYN)	1	38.5	*	—	—
Novonacco (NAC)	1	39.3	*	—	—
N.S.A.E. Paste (O)	1	40.6	*	—	—
Aerosol MA (ACC)	2	42.6	*	—	—
Oleo Glyceryl Sulfate C (O)	1	43.1	*	—	—
Aerosol MA (ACC)	1	50.5	*	—	—

* = Skein was attacked before sinking time could be determined. This occurred from 5 to 25 minutes after immersion.

[a] About 2 hours was required for mixing the ingredients and completing the filtration.
[b] Violent reaction took place before end of 3-hour period and test could not be made.

TABLE VI

Properties of Surface-Active Agent—Bleaching Powder Solutions of Maximum Oxidizing Power (Approximate OCl^- concentration, 4%)

Surface-Active Agent (in order of effectiveness)	Concn.	Surface tension	Time required to sink skein (6-gram hook used)		
			Immediately after filtration[a]	3 hours after filtration	21 hours after filtration
	%	dynes/cm.	seconds	seconds	seconds
Tergitol O8 (CC)	2	34.0	sank instantly	sank instantly	sank instantly
Naccosol A (NAC)	2	34.8	8	9	21
Tergitol O8 (CC)	1	38.3	16	17	33
Ultrawet D-4 (AT)	3	40.4	22	16	47
Naccosol A (NAC)	1	37.0	72	94	300
Novonacco (NAC)	1	38.9	75	107	371
Ultrawet D-4 (AT)	2	42.2	208	208	244
Sulfatate (G)	2	43.0	218	167	357
Aerosol MA (ACC)	1	41.3	226	190	312
Tergitol O8 (CC)	0.5	43.5	343	217	373
Alkanol S (duP)	2	50.8	386	427	654
N.S.A.E. Paste (O)	1	36.0	125	1114	x
Arylene (HP)	1	42.5	248	487	x
Emulgor A (G)	1	47.8	317	874	x
Aerosol MA (ACC)	2	43.6	682	580	x
Ultrawet D-4 (AT)	1	49.1	791	669	x
Invadine N (C)	1	37.9	365	x	x
Tensol No. 5Z (SYN)	1	41.2	560	x	x
Alkalon S (duP)	1	54.2	909	x	x
Oleo Glyceryl Sulfate C (O)	1	49.9	1017	x	x
Triton NE (RH)	1	39.7	x	x	x
Product BC (duP)	1	44.3	x	x	x
Sulfatate (G)	1	48.6	x	x	x
Gardinol LS Paste (PG)	1	49.5	x	x	x
Ultrawet 40 (AT)	1	49.6	x	x	x
Gardinol LS Paste (PG)	2	50.2	x	x	x

x = sinking time more than 1800 seconds.

[a] About 2 hours was required for mixing the ingredients and completing the filtration.

rate of disappearance of hypochlorite ion in calcium hypochlorite solutions is practically unaffected by Tergitol O8 (CC) and Gardinol LS Paste (PG), but is markedly accelerated by Ultrawet D-4 (AT), Aerosol MA (ACC) and Naccosol A (NAC). The rate of disappearance of the hypochlorite ion in bleaching powder solutions is practically unaffected by the addition of Tergitol O8 (CC), Naccosol A (NAC), Ultrawet D-4 (AT) and Gardinol LS Paste (PG). The last-named, however, has no appreciable effect on the penetrating properties of bleaching powder solutions. On the other hand Aerosol MA (ACC), which initially accelerates the rate of disappearance of the hypochlorite ion of bleaching powder solutions, is apparently oxidized to a product with penetrant properties.

DISCUSSION OF RESULTS.—Of the 130 surface-active agents tested, 113 were completely ineffective as penetrants under the conditions described. The other 17 were effective in varying degrees, as follows:

In calcium hypochlorite solutions of maximum oxidizing power (Table V), prepared with 1% of the surface-active agent, Tergitol O8 (CC) and Gardinol LS Paste (PG) were the only two agents which contributed satisfactory penetrating properties and retained their initial effectiveness long enough to be useful. Triton NE (RH), Product BC (duP), Sulfatate (G) and Alkanol S (duP) were effective in solutions 3 hours old, but after standing for 21 hours these solutions no longer showed improved penetrating power. Freshly prepared solutions containing Naccosol A (NAC), Ultrawet D-4 (AT) and Ultrawet 40 (AT) showed improved penetrating properties, but these properties were lost within three hours, and the first two caused destruction of the hypochlorite.

By varying the proportion of penetrant in these solutions, it was found that the concentration of Tergitol O8 (CC) could be reduced to 0.5% without seriously impairing its effectiveness. Increase in concentration effected a slight improvement with Gardinol LS Paste (PG), Ultrawet D-4 (AT) and Sulfatate (G).

In bleaching powder solutions of maximum oxidizing power (Table VI), Tergitol O8-(CC), Naccosol A (NAC), Novonacco (NAC) and Aerosol MA (ACC) were the only four agents which, when used in 1% concentration, contributed satisfactory penetrating properties and retained their initial effectiveness long enough to be useful. The last-named, however, promotes destruction of the hypochlorite ion. N.S.A.E. Paste (O), Arylene (HP), Emulgor A (G), and Ultrawet D-4 (AT) were fairly effective in solutions three hours old, but after twenty-one hours these solutions no longer showed any more penetrating power than a solution without any surface-active agent. Freshly prepared solutions containing Invadine N (C), Tensol No. 5Z (SYN), Alkanol S (duP) and Oleo Glyceryl Sulfate C (O) showed some improvement in penetrating properties, but after three hours this improvement was lost.

In this solution when the concentration of Tergitol O8 (CC), Ultrawet D-4 (AT), Sulfatate G) and Alkanol S (luP) was increased to 2% or more, their effectiveness was appreciably increased. A concentrated bleaching powder solution containing 2% of Tergitol O8 (CC) is approximately

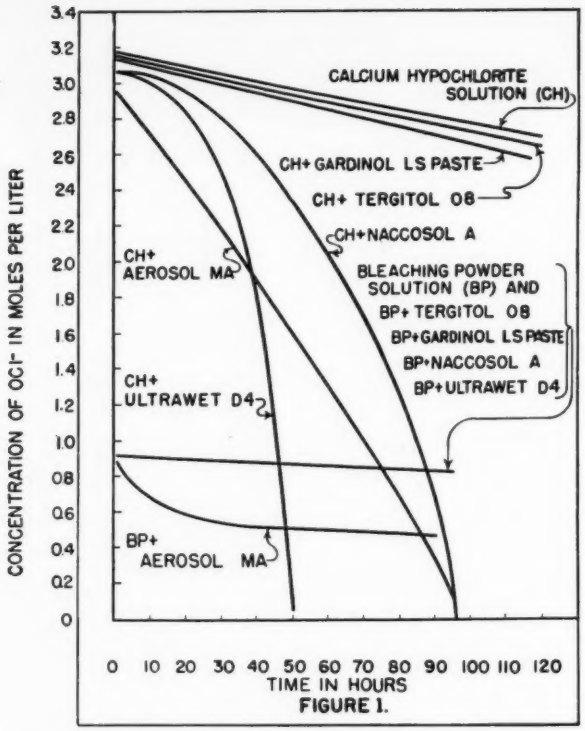

FIGURE 1.

equivalent in penetrating properties to a concentrated calcium hypochlorite solution containing 0.5% of the same penetrant.

Since some surface-active agents, notably Tergitol O8 (CC), are more effective in solutions containing high concentrations of dissolved salts, the most effective penetrants were also tested in more dilute solutions. The results of these tests are given in Tables VII and VIII. From these data it appears that Tergitol O8 (CC) is somewhat less effective in these dilute solutions of calcium hypochlorite than the other agents listed. Its relative effectiveness, however, is better in dilute bleaching powder solutions. This is probably attributable to the presence in bleaching powder of relatively large quantities of salts other than the hypochlorite and suggests that the penetrating qualities of Tergitol O8 (CC) solutions, dilute with respect to the oxidizing agent, can be improved by addition of any compatible salt.

The differences between the effect of Naccosol A (NAC), Ultrawet D-4 (AT) and Aerosol MA (ACC) on the stability of calcium hypochlorite and their effect on bleaching powder solutions, as shown in Figure 1, are striking. The reason for these differences is not known, but a possible explanation is that the active oxidizing ingredient of bleaching powder differs in some fundamental way from calcium hypochlorite.

Summary

Methods are described for preparing clear, aqueous solutions of maximum oxidizing powder from commercial calcium hypochlorite and from bleaching powder.

The effect of 130 commercial surface-active agents on the penetrating power and stability of the above-mentioned solutions was determined. The Draves-Clarkson test was used for the determination of penetrating power.

In concentrated calcium hypochlorite solutions, 0.5% of Tergitol O8 (CC) or 1% Gardinol LS Paste (PG) contributed satisfactory penetrating properties which were retained for 21 hours or longer. Neither showed any tendency to accelerate decomposition of the hypochlorite ion.

In concentrated bleaching powder solutions, 1% of Tergitol O8 (CC), Naccosol A (NAC), Novonacco (NAC) or Aerosol MA (ACC) contributed satisfactory penetrating properties which were retained for 21 hours or longer. When 2% or more of Ultrawet D-4 (AT), Sulfatate (G) or Alkanol S (duP) was used, they also gave fairly satisfactory results. A concentrated bleaching powder solution containing 2% of Tergitol O8 (CC) had approximately the same penetrating power as a concentrated calcium hypochlorite solution containing 0.5% of the same penetrant. Aerosol MA (ACC) accelerated decomposition of the hypochlorite ion.

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TABLE VII

Effect of Penetrants on Dilute Calcium Hypochlorite Solution (Approximate OCl^- concentration, 2.3%)[a]

Penetrant (in order of effectiveness)	*Surface tension*	*Time required to sink skein (6-gram hook used)*		
		Immediately after filtration[b]	*3 hours after filtration*	*21 hours after filtration*
	dynes/cm.	*seconds*	*seconds*	*seconds*
Ultrawet D-4 (AT)	38.0	4	4	9
Sulfatate (G)	39.2	6	15	15
Gardinol LS Paste (PG)	32.1	11	16	14
Tergitol O8 (CC)	36.0	44	32	47

[a] Solution used was the filtrate from a mixture of 50 grams of commercial calcium hypochlorite with a solution of 5.6 grams of the penetrant in 500 grams of water.
[b] About 2 hours was required for mixing the ingredients and completing the filtration.

TABLE VIII

Effect of Penetrants on Dilute Bleaching Powder Solutions (Approximate OCl^- concentration, 1.8%)[a]

Penetrant (in order of effectiveness)	*Surface tension*	*Time required to sink skein (6-gram hook used)*		
		Immediately after filtration[b]	*3 hours after filtration*	*21 hours after filtration*
	dynes/cm.	*seconds*	*seconds*	*seconds*
Naccosol A (NAC)	36.2	5	5	6
Tergitol O8 (CC)	43.7	255	320	280[c]
Sulfatate (G)	45.0	375	590	916
Ultrawet D-4 (AT)	44.3	302	395	>1800

[a] Solution used was the filtrate from a mixture of 50 grams of bleaching powder with a solution of 5.6 grams of the penetrant in 500 grams of water. Although there is a much smaller difference between the hypochlorite ion content of this solution and that of the concentrated solution of Table VI, than between the corresponding solutions of commercial calcium hypochlorite (compare Table VII with Table V), there is much greater difference in the concentration of other calcium salts.
[b] About 2 hours was required for mixing the ingredients and completing the filtration.
[c] Addition of 5.6 grams Tergitol O8 (CC) at this point decreases the sinking time to 2 seconds.

NEW SYNTHETIC FIBERS*

G. PRESTON HOFF

Manager, Technical Division, Rayon Department,
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A GREAT deal has been said and written on the subject of synthetic fibers. Perhaps I can integrate the subject and supply you with a *Reader's Digest*-style condensation that will cover the high spots. We will include all synthetic fibers except the glass fibers and the protein-base fibers. The so-called "cellulose-base fibers" are the ones we recognize as inaugurating the rayon industry, which has grown to such proportions in the United States since 1911 and, more particularly, since the First World War.

Let us consider the requirements and characteristics of a synthetic fiber which taken together amount to utility. Let us also consider how to proceed to develop a synthetic fiber.

How would you start? The crystal ball that reveals your answer directly and clearly hasn't itself yet been developed. The able and fortunate discoverers of the several well-known rayon processes did not start that way. The problem that concerned them was difficult enough, but it could be defined and expressed in reasonably simple language. Briefly, the common problem of those processes was—given the natural product cellulose or a cellulose derivative, how does one proceed to take this material from the solid or massive state into a fluid state and back to solid filaments and fibers? This common problem has been satisfactorily solved by the viscose, the acetate, the nitrocellulose and the cuprammonium processes. Having obtained the fibers in question, the originators could only hope that the fibers would be useful in the textile field. In no case could the developers say "If we solve this problem, we assuredly will have a new, useful product". They were obliged to proceed with blind faith, and hope for the best.

If we think in terms of utility, we can be more specific and get a little closer to the problem. Suppose we say "utility for what?". In the case of clothing, we are interested in protection, warmth, coverage, comfort, draping characteristics, durability, and service under all conditions of wind and weather.

In the case of industrial applications, the requirements vary widely. A yarn satisfactory for use as a tire cord may or may not be useful for wire insulation.

Again, for domestic purposes, the requirements of a towel or a handkerchief are entirely different from those of an upholstery fabric or a lace curtain.

A combination of high dry strength, high modulus, fatigue resistance, resistance to high temperature, and a reasonably good wet strength serves to define a tire yarn. Dyeing, hand, drape, covering power, etc., are unimportant.

Pick another combination of properties and you have an acceptable hosiery yarn. Choose still another and you have a good material for tents and awnings. Still another combination gives industrial filter fabrics, and so on.

Balance in desirable properties is vital. The strength of viscose process textile rayon can be pushed up much farther than it is—but so far not without destroying balance and reducing general utility. And always keep in mind that *one* serious deficiency can frequently offset the whole group of desirable characteristics. We can then define utility for any given use as an optimum balance of desired properties and no single serious deficiency.

So far, so good—there can be reasonable agreement on the combination of properties desired. But you still lack the clues to tell you what the material is that has those desired properties.

Nylon was not invented because anyone was able to say, "for a material that will make a satisfactory hosiery yarn, you need hexamethylene diammonium adipate". The utility of nylon was determined after the product had been made, first on a small scale, then on a larger and larger scale, and after years and years of effort we found that it *did make* a desirable hosiery yarn—after that it was found to do many other things—but it was all done the hard and expensive way.

Last fall, Dr. Quig of our organization gave a detailed summary of the status of our knowledge and development of "Orlon" acrylic fiber. This summary was published in the *Papers of the American Association of Textile Technologists,* March 1949. "Orlon" is a new fiber obviously, because the commercial plant for its production is only now being constructed and no output from it will reach the mills before late in the summer of 1950. So although many of you are familiar with "Orlon" and its general properties which distinguish it from nylon, nevertheless it is available in only limited quantities and the general public cannot as yet form any judgment as to its utility.

This prompts me to remind you, in another way, of the long period of time required to commercialize a new synthetic fiber.

Let us trace the development of "Orlon" acrylic fiber from the time that we first became interested in its properties and wondered if it might not be a useful fiber.

Preparation of 100 gram (¼ lb.) samples of the polymer in the laboratory was straightforward. The compound had been known for many years. Because the raw material for this fiber was one required in the synthetic rubber program during the war, we could assume an adequate supply in a reasonable price range.

Color, ability to obtain high molecular weight reproducibly, resistance to high temperatures and a few other significant properties found by tests made on the solid polymer seemed favorable. How then do we cross that hurdle of going into a fluid state and back again to the desired solid filaments? Melt spinning, which was so satisfactory for nylon when the conventional wet and solvent spinning methods proved unattractive, could not be made to work. It was known in the prior art that polyacrylonitrile could be dissolved in concentrated solutions of certain inorganic salts, and it may be recalled that wool and certain proteins are also soluble in these salts. Polyacrylonitrile solutions of this character had been made into fibers and films; but only limited progress was made in this direction because the properties were unsatisfactory. Further progress was expected when polyacrylonitrile was found to dissolve in certain complex ammonium compounds, but again nothing materialized.

It was concluded that the real obstacle to progress was the lack of a satisfactory solvent. When you think of solvents, I suppose you consider those in common use and available in quantity at a reasonable price,—gasoline, benzine, alcohol, carbon tetrachloride, glycol, etc. None of these worked. After a prolonged and intensive

* Presented before Fourth National Textile Seminar, Shawnee-on-Delaware, Pennsylvania, May 9, 1949.

search, a number of useful solvents were found and the work proceeded. "Orlon" acrylic fiber became a reality with the discovery of these suitable organic solvents. These were forthcoming not through Edisonian research, where you try everything on the shelf, but as a result of a painstaking theoretical approach which fortunately succeeded. Among these solvents can be mentioned dimethyl formamide, dimethyl methoxyacetamide, tetramethylene cyclic sulfone, the meta- and para-nitrophenols, and others.

But having a practical solvent did not mean that the research was over—it actually was just beginning. Just any solution of any concentration handled in the first fashion occurring to the research chemist does not give a fiber suitable for textile purposes. A careful search for the precise range of conditions to give useful filaments was the next step, and after that a further investigation of those conditions that gave the optimum balance of fiber properties.

Such a study never really ends. We are still learning about nylon, acetate and viscose process rayon, as we are doing for "Orlon".

An early goal, of course, has to be fibers of reasonably good properties—for the sole justification of all the work is the expectation that the final yarn will be useful. So just as early as possible, it is necessary to begin characterization of the yarn both on the basis of laboratory tests and on its behavior in test fabrics. You want the yarn before you develop a process for its manufacture so that you can decide whether the gamble is worth the time and expense involved.

But to make a commercially useful fabric, you have to have a reasonably acceptable yarn—not one with merely a good combination of physical properties but one largely free from yarn defects, broken filaments, uneven denier, and so on. To solve those problems, suitable spinning techniques are essential; these presuppose well designed operable equipment; this equipment requires spinning solution, which in turn requires polymer; so whether you like it or not, you are very soon struggling with the operation of a multi-step process on a continuous or semi-continuous basis and on a scale as large as 100 lbs. a day, for example.

But making polymer on a large scale carries its own problems; necessarily the way the polymer is made affects its properties and those affect all the succeeding operations as well as the characteristics of the yarn itself. So, patiently, the variables in the polymer process must be explored and brought under control; likewise, those of solution preparation; and "doubly likewise", those involved in spinning performance.

Our experience has been that, during or after spinning, the attractive synthetic fibers have required stretching to establish proper limits of strength and elongation. The degree of stretch for optimum results varies with the composition. This involves tremendous rearrangements in the internal structure of the fiber and success in the drawing depends on a very precise and uniform set of conditions. Those conditions must be found. Invariably they are affected by the way the yarn is spun. just as the spinning operation is influenced by the conditions of polymerization. The situation would be helped if we could count on making use of process equipment already worked out on existing fibers to produce these new candidates. Rarely is this possible without extensive changes, and frequently new equipment must be designed.

Although we operate four types of viscose processes, an acetate process and a nylon process, none proved suitable for "Orlon" and it was necessary to devise a new specific process. As early as 1944, a semi-works was put in operation to produce "Orlon" yarn for evaluation in a variety of military applications. Speed was crucial in the war effort so process development was minimized in favor of product evaluation. Until August, 1945, only possible war uses were investigated. By early 1946, utility in a number of peacetime uses looked promising. A survey of the situation, however, brought in the economic factor which is always pushed aside during a war. The process, assembled in a hurry, proved too expensive for commercialization and an acceptable one had to be found. This resulted in suspension of sample lots for experimentation by the mills and interfered with orderly market development. We appreciate the good spirit and understanding with which this situation was accepted. After much hard work and much grief, a new and satisfactory process was developed, and the necessary experimental equipment designed and tested. We look forward to the Camden, South Carolina plant sometime in 1950.

Remembering the period just described, it should be obvious to all that the development of any new synthetic fiber is a matter of long-range research, planning and accomplishment requiring dozens of highly skilled research chemists, physicists, chemical engineers, machine designers, and so on, working in the closest sort of cooperation. The scope and scale of the work are unbelievably and unavoidably expensive. I have by no means mentioned all the fields of activity required. Dye affinity, extraction of the solvent from the yarn if a solvent process is involved, solvent recovery, toxicological tests to insure that the product is harmless, choice of coning oils, yarn lubricants, weaving sizes, and so on, all pose problems that must be solved.

The research bill for a development of this magnitude runs into the millions, so does the laboratory, semi-works and pilot plant capital equipment required. All this has to be faced before putting up the capital for a commercial plant. Only a large organization with ample resources can tackle a job of this size. The risk of failure is ever present. And the amount of money which might be lost in the event of failure is so great that no individual or small company could afford the risk.

In a search for new synthetic fibers, it is easy to throw out those candidates which melt too easily, are colored, weak, brittle, unstable to ordinary conditions of weather, laundering, and the like. But beyond that, how do we identify those future fibers that will provide utility, comfort, style and satisfaction at better value to the consumer than he can get today?

Even the laboratory testing of fibers is tedious and expensive. But so far we have not been able to rely on those tests for final answers. They serve only to screen. The semi-works and the pilot plant stages follow and are enormously more expensive, and still we cannot pause. The yarns must be made in volume and tried out in a variety of end uses because in the long run only the customer can say that the utility of the product justifies the price.

It is a big risk. If it pays off, a great many people will benefit. The weaving mills, the knitters, the throwsters, the dyers, the finishers, the converters and the consumers will all share in the success. It has been so with nylon and we trust it will be so with "Orlon". Jobs will be created—at Camden and all along the line. The days when the lone inventor comes up with a major new product or process seem to be behind us. It is from long-range research programs of the large and stable companies that developments of this character and magnitude are likely to emerge.

I have in the last few minutes tried to portray to you the fascinating complicated procedure of bringing forth a useful synthetic fiber. With "Orlon", as with nylon, we have been obliged for the most part to solve the problems the hard way, depending on extensive evaluation requiring the co-operation and judgment of the throwsters, weavers, and all other branches of the textile industry for assistance in reaching reliable conclusions.

Must we always do it in such a manner? I hope and believe not.

At one end of the scale where the chemists and engineers are gaining new knowledge of molecules, their chemistry and structure, much of value has been and is being accumulated. There has been quite an overlapping of interests between the synthetic fiber, synthetic rubber and plas-

(Continued on Page 479)

Proceedings of the
American Association of Textile Chemists and Colorists

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Correction

Re: "Studies on Wool Dyeing: Effect of Metals on Tippy Dyeing"

THE caption of Figure 26, page P385, May 2nd issue, in the above-named paper, should read "4 p.p.m. Radiocobalt chloride-acetate mixture" instead of 2 p.p.m.

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Report of Clemson College Student Chapter

AT a meeting of The Clemson College Student Chapter on May 4, 1949, Feaster Trible and Tom McElwain of the Interchemical Corporation presented a film entitled "Pigmented Emulsions in Textile Printing," and showed samples of such colors on different fabrics.

A business meeting was held later, and officers were elected for the coming school year.

Respectfully submitted,
H. M. REYNOLDS,
Secretary

—♦ ♦—

Hudson-Mohawk Section Outing on June 17th

THE Hudson-Mohawk Section will hold its first annual outing on Friday, June 17, 1949 at the Antlers Country Club, Amsterdam, N. Y. The Antlers Club is located four miles west of Amsterdam on Route 5 at the foot of Tribes Hill. All members and their friends were invited to attend.

Golf, softball and games will be on the program, with prizes for the winners of all contests. Golfers may start play any time after 9:00 A. M. Dinner will be served at 6:30 P. M.

Reservations closed on June 10th.

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Mid-West Outing on June 18th

THE Annual Outing of the Mid-West Section will be held on Saturday, June 18th, at Lake Lawn, Delavan, Wisconsin. The following is the program:

9:00 A. M. Registration in Hotel Lobby.

9:00 A. M. Softball Game.

11:30 A. M. Buffet Luncheon in Hotel Dining Room.

11:45 A. M. Golf Tournament.

1:30 P. M. Ping Pong and Horseshoe Tournaments.

Dinner will be served in the evening.

Piedmont Outing on June 24th and 25th

THE Summer Outing of the Piedmont Section will be held on June 24th and 25th at the Ocean Forest Hotel, Myrtle Beach, S. C.

Registration will be conducted in the hotel lobby, Friday evening and Saturday morning. Entertainment includes swimming, sunning, fishing, golf, tennis and shuffleboard. Dancing will be held Friday and Saturday nights on the Patio. A banquet will be held at 7:30 Saturday evening. Special entertainment features for the ladies have been provided.

—♦ ♦—

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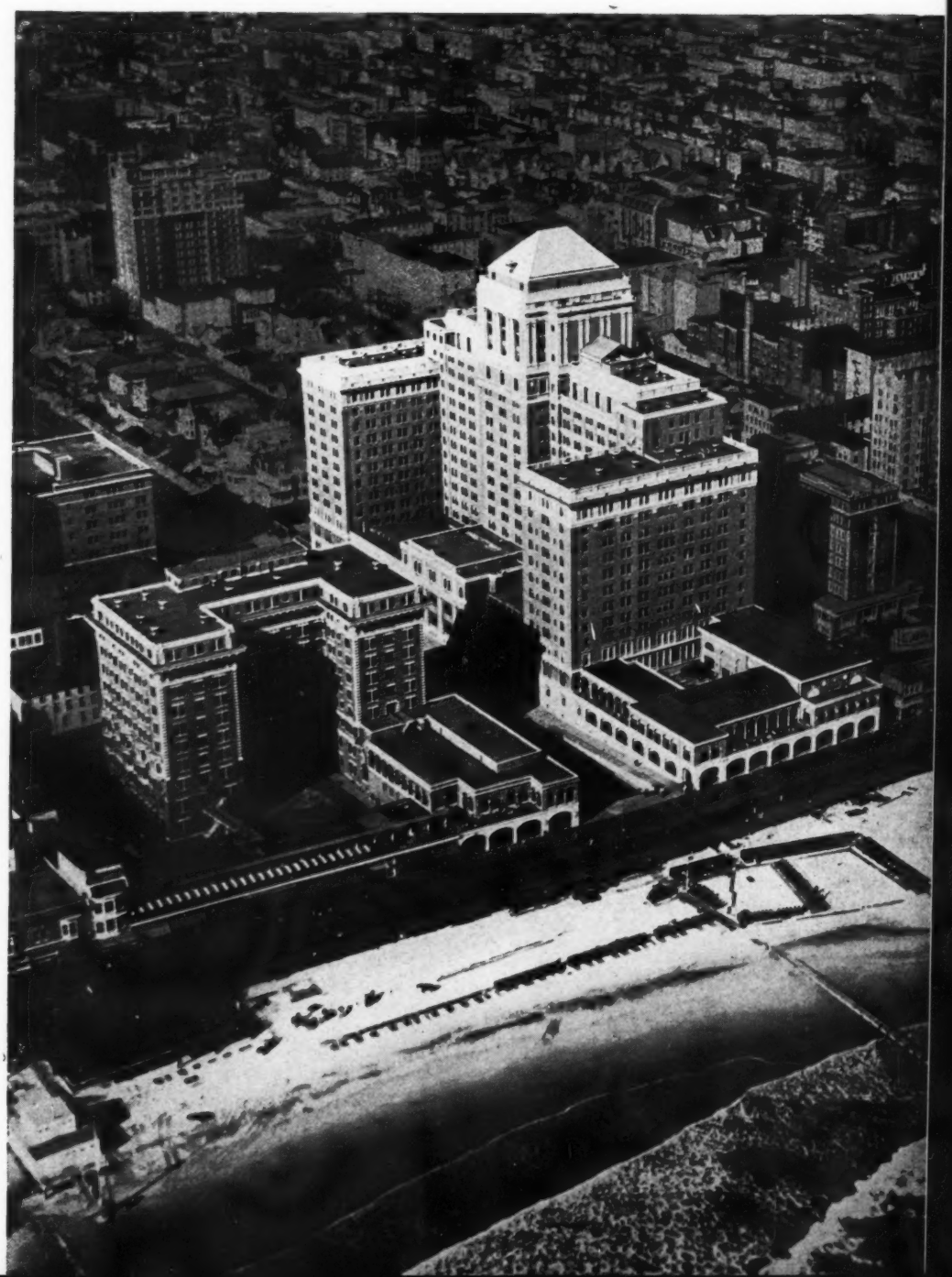
Charles P. McHugh—Production Mgr., Raybestos Manhattan, Inc., Passaic, N. J. Sponsors: A. F. Johann, H. D. Kinsey.

(Continued on Page P464)

1949 CONVENTION NOTES

ATLANTIC CITY, N. J., site of the 28th National Convention of the American Association of Textile Chemists and Colorists, proudly claims title as the "Playground of the World." It also is gaining increasing fame as a convention city and, because of its desirable facilities for such affairs, was selected by the Philadelphia Section as the spot for the October 13-14-15 meeting this year.

While known primarily as a summer seashore resort, Atlantic City is attractive



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CHALFONTE-HADDON HALL

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ATLANTIC CITY

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1949 A.A.T.C.C. CONVENTION CENTER

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to thousands as an excellent setting for spring and fall vacations. October is an ideal month at the Jersey Shore, the summer crowds are missing, and yet there still are plenty of attractions to interest the visitor. October horse-back riding on the beach is a feature attraction for the early morning fresh-air addict and it is not unusual to find some hardy individuals taking a dip in the Atlantic.

There's also the famous Boardwalk, now 60 feet wide and eight miles long (time was when it was one mile long and was taken up at the end of the summer season—but not today). The rolling chairs are available for sight-seeing along the ocean-front and such a trip takes one past the Steel Pier, amusement center projecting a half mile out to sea, Convention Hall, scene of the annual Miss America contest, and other points of interest.

The convention will be held at the Chalfonte-Haddon Hall, the famous hotel which identifies itself as "first on the Boardwalk." Fronting on the ocean, the hotel will house all convention activities, including exhibits, technical meetings, social affairs, etc.

The 1949 Convention Committee suggests that a good conditioner for the winter months, for members from all parts of the country, would be a trip to Atlantic City in October, to acquire the latest technical information, important in these competitive days, and also for a fall "tonic" from the invigorating climate of the Jersey Shore.

IMPORTANT REMINDER. — There already have been many requests received for hotel reservations. The Convention Committee points out that reservations will be accepted only on the regular A.A.T.C.C. convention forms, which will be mailed to all members in the near future. The Committee feels that this is the fair and proper way to handle reservations.

TECHNICAL PROGRAM.—Arthur W. Etchells, of Hellwig Dyeing Corp., Philadelphia, and chairman of the technical program committee, is interested in hearing from members or companies desiring to present a paper at the Convention, particularly for the Non-Cellulosic Group Meeting.

EXHIBITS.—A preliminary survey indicates that the textile and allied industries will be well represented with exhibit booths. The Committee suggests that those contemplating taking exhibit space act promptly.

Membership Applications

(Continued from Page P462)

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M. Rakvidhyasastra — Director, Praneet Industries, Bangkok, Siam.

S. Soltan Talib—Typist & General Clerk.

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Atlantic City

Convention

October 13-14-15

"Education through Association"

Rhode Island Section—

HEADACHES OF A DYESTUFF CHEMIST*

H. W. GRIMMEL

Metro Dyestuff Corp.

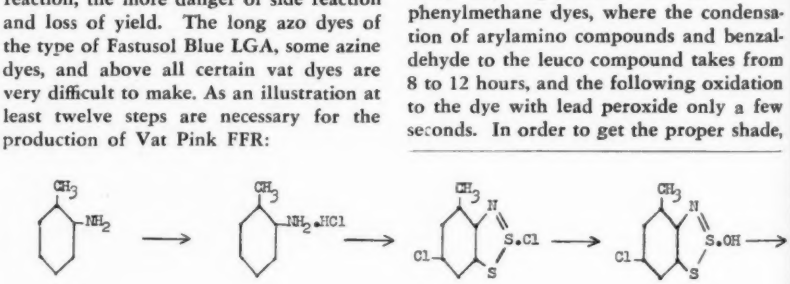
IT appears on analysis that headaches and problems of the dyestuff chemist can be divided, like ancient Gaul into three parts, technical, chemical, organization and selling. Depending on the size and kind of organization with which one is connected there might be others.

The consumer of dyes is looking not only for the best, but above all, an absolutely uniform quality of dyes, and the dyestuff chemist would like nothing better than to give this to him constantly. Here is where his troubles begin, and where his right to existence becomes evident. We all start with raw material of one kind or another. In order to deliver uniform products, uniform raw materials are very desirable and often essential.

The dyestuff industry is a comparatively small industry, and the quantity of chemicals needed for this industry alone does not warrant establishment of continuous processes for most of its products which alone could guarantee absolute uniformity of quality. Furthermore, the operations involved in the manufacture of many intermediates or dyes are far too complicated to permit such installations. Only a few simple intermediates and chemicals are being supplied on a strict physical specification basis, for instance naphthalene, aniline and phthalic anhydride. The great majority of intermediates are produced in batch processes and vary in their quality. I think of compounds like H Acid, J Acid, Gamma Acid, etc. There has been, of course, a great deal of effort to employ continuous processes but they have failed. Quality of intermediates is judged by analytical figures or by the actual synthesis of the dyestuff in the laboratory.

It is no accident that no other chemical industry has such a high ratio of chemist to working man as the dyestuff industry. Intricate supervision has to make up for unavoidable variations in materials and methods. It is the task of the dye chemist to produce, always from intermediates *varying in quality*, the same type of dyestuff with exactly the same quality as the type. This is not always easy since the variables of every chemical process are legion and even the best trained operators have been known to slip once in a while. Nevertheless, I hope that you agree with me that the products which emerge from the dyestuff synthesis in general are rather uniform as far as deviation from a given type is concerned. The degree of tolerance of the buyer, on the other side, is not inflexible either, and experience shows that the latter is to a fair degree even a function of the season and the business outlook.

There are great differences in the ease or difficulty with which dyes are formed. The more steps there are involved in the synthesis of a dye, the more sluggish the reaction, the more danger of side reaction and loss of yield. The long azo dyes of the type of Fastusol Blue LGA, some azine dyes, and above all certain vat dyes are very difficult to make. As an illustration at least twelve steps are necessary for the production of Vat Pink FFR:



Obviously such a dye cannot be made in 24 hours, it takes about 10 working days, and when the dyestuff is formed, its proper conditioning for printing paste or dyeing requires additional time. Every step outlined above is a trap for the unwary chemist and the proper selection of equipment alone is in itself a task. Some of the reactions are extremely corrosive, others produce irritating by-products which cause itching and eczema. In addition, great volumes of liquids have to be handled and very poisonous substances like NaCN must be used. The finished product has to have the proper shade, should reduce properly and print in the right strength both on cotton and rayon. In addition, the paste should not settle out on long storage, and should have as bright an appearance as possible. In short, it must resemble the type.

In other cases the dyestuff formation takes only a split-second as with the triphenylmethane dyes, where the condensation of arylamino compounds and benzaldehyde to the leuco compound takes from 8 to 12 hours, and the following oxidation to the dye with lead peroxide only a few seconds. In order to get the proper shade, it is essential that the latter be dumped into the reaction mixture. Careful slow addition will surely lead to dull low yield charges.

* Presented at meeting, Rhode Island Section, March 25, 1949.

As far as the dyestuff type is concorned, let me say that it should represent an average reproducible quality of actual dyestuff manufacture. Unfortunately, many deviations have been made from this golden rule. Competition and over optimism of chemists have in some instances forced the quality of types to pinnacles where they do not represent any more the average but rather the top quality. In such cases, the dye chemist is in for major continuous headaches. We are not speaking about the results of improvements such as the use of better equipment or purer intermediates. In such cases, it is advisable to establish a new independent type for the better product and retain the old one.

I remember a case in the Naphthol AS line where we made one naphthol compound according to a well-established process. We were not satisfied with this compound and set about to improve the process. Success was with us and we obtained in the laboratory, and finally in the plant, a product with a 15% higher yield, much lighter appearance, and yielding brighter shade. Our sales department was delighted too, but four weeks later we received very severe complaints. Our product allegedly was impure. It was supposed to show a great deal of residue when dissolved with caustic soda and it did not give the accustomed shade. These complaints came from a lake manufacturer. Luckily we were able to demonstrate that the alleged residue was not dirt but pure naphthol. The solubility of the pure compound was lower, as was to be expected. Our new product was much purer. Nevertheless, we had to go back to our old manufacturing method to supply the customer with his desired compound, much to the chagrin of the dye chemist. Our textile customers, on the other hand, liked the new product and we therefore carried both types.

It is hard for a young dyestuff chemist to team his enthusiasm and chemical knowledge to the exigencies and demands of the trades. His reasoning and desire to improve products is fully logical from his viewpoint but he might fail to take into consideration the reasoning of his customers. The tests which a customer insists on, that his deliveries should meet, do not always make sense to the young chemist. They make very good sense to the customer, and since he pays for the goods, he is the ultimate judge.

Speaking of such tests, I remember when 25 years ago we used to make Benzo Purpurine 4B for the Far East trade. It was a very nice smooth-running business until, one day, we received complaints that our shipments, although perfectly right as far as the dyeings were concerned, did not meet the customer's spit test.

This test in vogue in the Far East is a very simple procedure. The prospective buyer in the bazaar will spit into his hand, put some dyestuff on the saliva and rub it out. If after some rubbing a greenish bronze appears, the dyestuff is satisfactory for his requirements. If not, he will reject it. We have to consider that not every buyer of this kind has a laboratory and accurate testing methods at his disposal, and that adulteration of dyes in the Far East, in past decades, has been far too common. Of course, our deliveries were not adulterated, yet they did not give the test, and after some strenuous work we found the reason in the use of purer intermediates than we had used in the past.

Progress is definitely desirable from both the consumer and producer standpoint, but should be made only very carefully. I will not say that undue caution should stifle progress and the record of the dye maker does not trend in this direction.

A recipe of the old Elberfelder Farbenfabriken in 1867, for instance, called for the addition of forty-eight egg whites per batch of aniline blue. Only thus, it was claimed by the foreman, could a bright greenish light blue be obtained. Perhaps it was premature knowledge of colloid chemistry on the part of the foreman, perhaps the moral effect on the workmen who were allowed to work up the remaining egg yolks into pancakes right on the spot had something to do with the success of this blue. Business increased, and as time went on the foreman and his recipe were replaced by less gastronomic, but more efficient scientific methods. It took all of 20 years since the invention of the first aniline dye until strictly scientific methods prevailed, but when one glances through the patent literature dealing with items like auxiliary printing agents for vat colors and the like, one wonders whether the scientific approach has really replaced the practice of the art.

An enormous amount of work and headaches goes into the daily work of the dyestuff chemist and one might speculate whether this continuous struggle is not due to the fact that dyestuff chemistry was brought into this world by a somewhat roundabout route and in competition with Mother Nature's own natural dyes.

William Henry Perkin invented the first aniline dye. He was 18 years old when he read that quinine on distillation with alkali had yielded aniline oil. Now we all know that this is a very costly synthesis of aniline oil, and possibly Perkin speculated that it should be much more interesting economically to synthesize quinine from aniline. In 1856 he reacted aniline oil with chromic acid. According to the laws of chemistry, he could not and did not obtain quinine. His basic conception was wrong. He did get, however, a violet dye (less than 5% to be sure) which he isolated in painstaking labor from the black reaction mass. This was the famous Mauvein. The joker in his experiment was that if his starting material had been pure according to modern standards, he could not even have obtained his violet dye.

Knowledge of his chemistry, perseverance and time will usually see the chemist through his dark hours of despair, but blind luck, entirely unfettered by chemical knowledge, occasionally helps a bit too. The successful production of phthalic anhydride when a thermometer broke and mercury was discovered to be a catalyst in its production is a case in point or take the story of Aldehyde Green. Prior to its discovery, a rather beautiful blue dye had been invented by Lauth through the action of paraldehyde on rosaniline in sulfuric acid. Unfortunately, it lacked fastness to light. A photographer knowing that sodium thiosulfate would fix the rather light-unstable negative of a photographic plate proposed to a dyer to subject his dyeing of Lauth's Aldehyde Blue to the same treatment. The dyer did not get a light fast blue, but he did obtain a beautiful green of an extraordinary clarity of shade. Furthermore, it had the unheard-of property of retaining this green shade under artificial gaslight. Such cases are the exception. The dye chemist of today has to work a bit more methodically. Making the proper shade of a dye is not his only worry. He has to consider many other features like solubility, non-dusting properties, sublimation, dischargeability, and last but not least, his dyestuff yield. In addition, he is called upon to make his dye meet specifications not directly connected with dyeing properties.

In the export trade the specific density of a dyestuff, for instance, can be of the utmost importance. A native in India who wants to dye his turban, and buys the necessary dye by the spoonful, wants to get a full spoonful and not one-half the amount. He buys by the measure, not by weight. There is no use arguing that he gets the same amount of dyestuff. He also wants to have the dye powder appear bright. Many headaches have been caused by the stubbornness of the dyestuff in refusing to comply with such demands. Grinding in so-called French-ball mills with or without alcohol, or spray drying, is frequently the answer.

Then there is the ever-recurring demand for the highest concentration of dyes for the export trade. Woe to the chemist who too optimistically yields to the sales department, and later on spends sleepless nights over the problem of how to duplicate a previous delivery of a very high concentration. In such cases, and in many

cases of dye application, the dyestuff making ceases to be a science, and is still an art.

Good reliable personnel is a necessity, and the training of such operators takes a long time. Reliable workmen are especially indispensable when the process is being changed in the manufacture of a dye, and every phase of its operation has to be watched carefully. Alert and experienced operators are a blessing in such times.

A summary of headaches of the dyestuff chemist would not be complete without reference to his contacts with his customers. As a rule, the direct contact with a customer is almost non-existing, and then it is usually through the middleman in the form of complaints. Psychologically, this is a poor way to acquaint both parties with each other. Yet that is the way it is. On the one side we have the manufacturer, on the other side the customer. In between them, as a rule, the sales department has put up its tent. Where it acts as the buffer, it is a blessing for the dyestuff chemist, where it solely takes over the functions of an amplifier of customer complaints, legitimate though they may be, and dins all the weak features of the creations of a poor chemist into his ear, it ceases to be a blessing. That poor man most likely is already aware of them and has spent several sleepless nights worrying and does not know what to do about it. After all, his experiments take time and before they are finished, he can do nothing but offer apologies, ask for time, worry himself sick and develop a grouchy disposition.

What about the equipment? Brand new equipment, beautiful though it might look, is not always the most desirable feature. It shares that distinction with a brand new shoe. For comfort, there is nothing better than an old shoe. Intricate gadgets and streamlined apparati are not always synonymous with usefulness and efficiency. Naturally the apparatus used is adapted to the chemical reactions leading to the different dyestuff classes. Vat color equipment is of a different type than machinery used for triphenylmethane dyes. Wooden vats are the characteristic of azo dyes. It stands to reason that equipment where diazo salts are manufactured has to be of a different kind then that used for nigrosines or Naphthol AS compounds. If the manufacturing plant is large and rich it can afford to have special equipment for all different types. If it is medium or small, combination machinery is resorted to and different types of colors are made in the same equipment. When enameled kettles are used, the chemist's worries never cease. When damaged, repairs are always of a questionable nature. In all cases, and with every kind of equipment, good knowledge of the possible chemical reactions involved, in which the material of construction might enter, is essential. The wooden vat, for instance, has been known to enter into more than one reaction with the process chemicals and complete reduction of an azo dye when processed in caustic in wooden equipment is more than just a possibility. Brick lining of closed and open vessels is common, both in acid proof and alkaline construction. Filter presses require great care if they are expected to last. The vigilance of the chemist is never allowed to relax. His is, after all, an interesting profession, with new problems and new headaches facing him every day. As a rule he comes to love this strenuous life of his, provided he looks upon his occupation as a profession and not as a job. His daily troubles make him especially understanding of the problems his neighbors are facing, and you will always find him glad and eager to extend a helping hand wherever desired.

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CALENDAR

WESTERN NEW ENGLAND SECTION
Outing: June 24

NEW YORK SECTION
Outing: June 17.

PHILADELPHIA SECTION
Meetings: September 16, November 11 (Kugler's, Philadelphia).

PIEDMONT SECTION
Meetings: June 24, 25, 26 (Ocean Forest Hotel, Myrtle Beach, S. C.), November 5 (Charlotte Hotel, Charlotte, N. C.)

HUDSON-MOHAWK SECTION
Meetings: September 16, November 18.
Outing: June 17.

RHODE ISLAND SECTION
Outing: June 24

MID-WEST SECTION
Outing: June 18 (Lake Lawn, Delavan, Wis.).

COUNCIL
Meetings: Sept. 9, Dec. 9.

RESEARCH COMMITTEE
Meetings: Sept. 9, Dec. 9.

NATIONAL CONVENTIONS
1949: October 13 to 15, Chalfonte-Haddon Hall. Atlantic City.
1950: Portsmouth, N. H.
1951: October 18 to 20, Statler, New York.

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EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

49-11

Education: B.T.C., Lowell Textile Institute.

Experience: Superintendent of Dyeing and finishing, wool and other fibers.

Age 37; single but with dependents; references; New England preferred.

5-16, 5-30, 6-13, 6-27

49-12

Education: Pratt Institute, and City College of New York, chemistry.

Experience: Continous employment since 1920 as laboratory supervisor, dyer and mill chemist.

Age 49; married; references; position in southwest U. S. desired.

5-30, 6-13, 6-27, 7-11

49-13

Education: Lowell Textile Institute, B.T.C.

Experience: Laboratory and mill chemist, 1931 to date.

Age 41; married; references; position as plant chemist or executive, or in sales, desired.

5-30, 6-13, 6-27, 7-11

49-14

Education: B.S., Brooklyn College, now completing year in Bradford Durfee Technical Institute.

Experience: Instrument specialist, U. S. Army Air Corps.

Age 25; married; position as dyestuff or textile chemist near New York, or elsewhere on Atlantic Coast, desired.

5-30, 6-13, 6-27, 7-11

All correspondence regarding the Employment Register should be addressed to the National Secretary

TRADE NOTES • NEW PRODUCTS

• Sales of Synthetic Organic Chemicals

In 1947 the sales value of synthetic organic chemicals and their raw materials produced in the United States reached a record of two and one-half billion dollars, according to a final report released by the United States Tariff Commission. In 1947 the quantity of production (38 billion pounds) and the quantity of sales (26.4 billion pounds) were also greater than in any previous year. On the basis of sales value, the most important groups of synthetic organic chemicals produced in 1947 were plastic materials, medicinals, and elastomers (synthetic rubbers). A preliminary report covering 1947 was issued previously.

Over 550 manufacturers furnished reports in this survey covering their manufacture and sales of over 6,000 individual chemicals and finished products.

Copies of the report, *Synthetic Organic Chemicals, United States Production and Sales, 1947* (Report No. 162, Second Series), may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 45 cents each.

• L.T.I. Library Fund

The most recent substantial gift from industry, received by the Lowell Textile Institute Alumni Association in its campaign to provide a new Library building, has been a gift of $25,000 from the Edgar and Emily Hesslein Fund, Inc., of New York City. It represents a gift of the entire first floor of the right wing consisting of reading rooms, foyer, Librarian's office and work room.

This splendid gift brought the total building fund to a point where the Board of Directors and the Building Committee felt justified in authorizing the architects to issue plans and specifications to builders for their bids.

• Textile Machinery Exhibition

The first British exhibition of textile machinery to be held since 1938, is now being organized by the Textile Recorder Textile Machinery Exhibitions Ltd. In spite of the absence of exhibitors from certain countries not yet in a position to participate, so great has been the demand for space that it has been found necessary to plan the erection of a temporary extension hall, and even the additional accommodation thus provided has all been taken up.

Exhibits are not confined to British firms, and several countries overseas will be represented, including Switzerland, France, the United States, Denmark and Italy. Altogether the products of 150 to 200 firms will be on view. The exhibit opens on October 12 and will run to the 22nd at Belle Vue, Manchester, England.

• P.T.I. Graduation

The largest class in the sixty-five year old history of the Philadelphia Textile Institute was graduated on June 4th, 2:30 P. M. at the site for the new Philadelphia Textile Institute, School House Lane and Henry Avenue, Germantown.

The principal speaker at these exercises was Dr. Edward R. Schwarz, Professor of Textile Technology in charge of the Textile Division at the Massachusetts Institute of Technology.

Thirty-seven students received Bachelor of Science Degrees in Textile Engineering while eight students received Bachelor of Science Degrees in Chemistry, Dyeing and Printing.

Textile Diplomas were awarded to thirty-three students while six students received Chemistry, Dyeing and Printing Diplomas and three received Knitting Diplomas.

Evening school certificates for proficiency in textiles were awarded four students.

These graduation exercises were the first official school function to be held on the spacious new property at School House Lane and Henry Avenue where the Institute will open its fall term on October 4th.

• Glycerine Sections of Beilstein Translated

One of the most important scientific works in the field of organic chemistry has been translated into English for the first time, by a board of three translators and five editors from the staff of the research laboratories of the Glycerine Producers' Association. It comprises the sections on glycerine and some glycerine derivatives from Beilstein's *Handbook of Organic Chemistry*, 4th edition. The book is thoroughly indexed and covers the literature to 1910 in the main work, and in the First Supplement 1910-1919, and the Second Supplement 1920-1929, Volumes 1-6. The German interests in the United States in this material were vested in the Alien Property Custodian in 1942, 1943, and 1946. The translation was prepared by permission of the Attorney General of the United States in the public interest under License JA-1336.

This edition of 210 pages, lithoprinted from the author's typescript, was published by the Research Committee of the Glycerine Producers' Association. It is available at $2.50 per copy from the offices of the association, 295 Madison Avenue, New York 17.

• IRI Officers

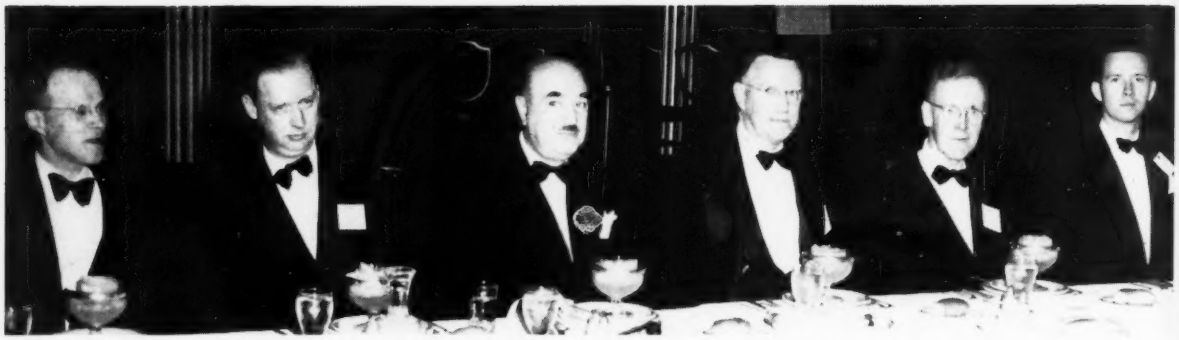
J. H. Schaefer, Vice President, Ethyl Corporation, was elected president and C. F. Rassweiler, Vice President for Research and Development, Johns-Manville Corporation, was elected vice president of Industrial Research Institute, Inc. at its annual meeting May 23-25. C. G. Worthington was re-appointed secretary-treasurer. Fred Olsen, Director of Research and Development, Olin Industries, Inc. and H. N. Stephens, Research Director, Minnesota Mining and Manufacturing Company, were elected to three-year terms on the Board of Directors.

The meeting was held at the Hotel Berkeley-Carteret, Asbury Park, N. J. and at the new Johns-Manville Research Center, Manville, N. J. One hundred and twenty-five research executives from member companies and their guests attended and discussed current problems and trends affecting industrial research. On the last day of the meeting the group was a guest of Johns-Manville Corporation in a tour of the research center and a final technical session.

• L.T.I. Golden Anniversary Reunion

The feature of the Golden Anniversary Reunion of the Lowell Textile Institute Alumni Association was the laying of the cornerstone for the $200,000 Alumni Library in Lowell on May 14th. The library is located between two new $250,000 dormitories, directly across Textile Avenue from the main buildings of the Institute.

A dinner meeting of the Association was held the night before in Boston, in the Georgian Room of the Hotel Statler. James F. Dewey, '04, was Toastmaster



Head Table at the Dinner Meeting of the Lowell Textile Institute Alumni Association, Georgian Room, Hotel Statler, Boston, May 13th.

and Kenneth R. Fox, '38, President of the Institute, welcomed those present. Entertainment consisted of a hunting and fishing talk by Chief Henry Red Eagle, a famous Indian Maine guide.

At the business meeting in Lowell on the 14th, A. Edwin Wells, Treasurer of the Association, reported on funds available for the library building and President Fox reported on the progress of the Institute in recent years. Mr. Fox was presented by A. Chester Clifford, '22, President of the Alumni Association.

Scrolls for outstanding contributions to the textile industry and its allied arts were awarded to J. Milton Washburn, '21, Emery Industries, Inc., Gilbert Verney, Verney Corporation and Harold M. Chase, Dan River Cotton Mills.

Mr. Wells was reelected Treasurer and Clerk and five new members of the board of directors were elected: Ralph K. Hubbard, '11, David B. Dolge, '47, A. Clement Deering, '23, Albert J. Gilet, '20, and Albert W. Williams, '32.

A baseball game between L.T.I. and American International College followed a luncheon at the new cafeteria and concluded the program.

The committee for the Golden Anniversary Reunion consisted of: Roger C. Griffin, '43, *Chairman,* William F. Brosnan, '27, *Vice-Chairman,* Richard W. Rawlinson, '31, *Publicity,* Kenneth B. Park, '16, *Entertainment,* Milton Hindle, '25, *Athletics & Orchestra,* Edward B. Bell, '24, Theodore W. Fox, '40, Frank W. Gainey, '11, and Simon Shapiro, '34.

• Report on Ramie

Experiments in the domestic cultivation, processing and use of ramie, one of the strongest of natural fibers, are described in a new report released by the Office of Technical Services of the U. S. Department of Commerce. The report summarizes work done in Florida by the University of Florida in cooperation with the Department of Agriculture under a comprehensive research contract with the Office of Technical Services.

It describes ideal ramie cultivation practices for the Florida Everglades area, including harvesting techniques; degumming and decortication methods, which have heretofore been the primary barrier to domestic ramie utilization; the strength and quality of various ramie fibers; and ramie leaf meal byproducts for cattle feeding.

In issuing the report O. T. S. emphasized that while the results of the new experiments were promising, much was still to be learned about the economics of ramie.

Cooperative research between the University of Florida and the Department of Agriculture is continuing, O. T. S. said.

PB 97342, *Ramie Production in Florida,* 197 pages including tables, charts, illustrations, sells for $5 per copy. Orders should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C., accompanied by check or money order payable to the Treasurer of the United States.

On request, the Office of Technical Services will also furnish references to other reports on ramie in its collection.

• Officers of ITT

Roger Milliken, president of Deering Milliken & Co., N. Y., N. Y., was reelected chairman of the board of the Institute of Textile Technology in Charlottesville at the annual meeting of the board which was held in connection with the Annual Executives' Conference sponsored by the Institute on April 8.

The other officers elected include: Joe L. Lanier, vice president of West Point Manufacturing Co., West Point, Ga., elected vice chairman; Ward Delaney, Char-

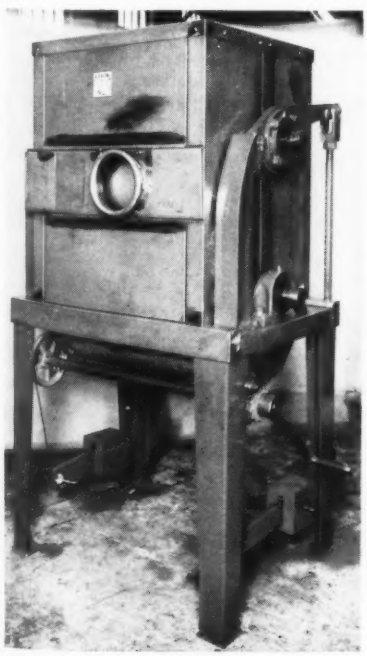
lottesville, reelected president; Arthur M. Allen, Hinckley, Allen, Tillinghast & Wheeler, Providence, R. I., reelected secretary, Norman E. Elsas, president of Fulton Bag and Cotton Mills, Atlanta, Ga., reelected treasurer.

At the annual membership meeting which was held prior to the board meeting the following were elected to the Board of Trustees: T. M. Bancroft, president, Mt. Vernon-Woodberry Mills, Inc., Baltimore, Md.; Herman Cone, president, Cone Mills Corp., Greensboro, N. C.; Julian T. Hightower, vice president; Thomaston Mills, Thomaston, Ga.; Charles H. Merriman, Jr., vice president, Crompton-Shenandoah Co., Waynesboro, Va.; Charles B. Nichols, president, Appleton Co., Anderson, S. C.; R. W. Philip, vice president, Callaway Mills Co., LaGrange, Ga.; Walter Regnery, president, Joanna Cotton Mills Co., Joanna, S. C.; and S. H. Swint, president, Graniteville Co., Graniteville, S. C.

Plans were made for a series of seminars to be held at the Institute for the outstanding graduate of the nation's textile schools. Details of this plan have not yet been worked out.

• Vertical Rope Squeezer

Cook-P & N Machine Co., Inc., 365 Dorchester Avenue, Boston 27, Mass. announces a new vertical rope squeezer. This machine is made entirely of fabricated steel with the frame and roll standards of mild steel, and the enclosure of stainless steel.



Cook-P & N Vertical Rope Squeezer.

The bottom roll has stainless steel covering and the top roll is rubber covered. Both rolls revolve in self-aligning ball-bearing pillow blocks. Pressure is through weight and compound leverage with mechanical lifting device. Stainless steel pot-eye on entering end is adjustable across the face of the roll.

Enclosure is arranged with a full sized door on delivery end. Other models are made with rolls in horizontal position and with pneumatic pressure if desired.

• Returns from European Tour

Joseph H. O'Donnell, Treasurer of the Woonsocket Color & Chemical Company, returned recently from a tour of European textile centers. He visited England, Holland, Belgium, France, Switzerland and Italy, contacting the agents of Woonsocket in these countries. In Paris he met Henry A. Firpo, representative in France and father of Jack H. Firpo, Export and Sales Manager of Woonsocket.

• Joins Masury-Young

The Board of Directors of Masury-Young Company, 76 Roland Street, Boston, Mass., has announced the election of Francis R. Rody of Andover, Mass., as Textile Chemical Engineer. The activities of Mr. Rody will be closely co-ordinated with Textile Chemical Research and Sales Promotional work in the Textile Division.

Mr. Rody was associated with the Chemical Division of the American Woolen Company for thirteen years as analytical, dye and research chemist. The latter five years with the Company were in the capacity of Assistant Chief Chemist of the Wood Worsted Mills of Lawrence, Mass. For the next five years, he was with Masury-Young Company as Chief Textile Research Chemist. In 1946, he became associated with L. Sonneborn Sons, Inc., of New York, as Technical Representative. He recently resigned his position with them to return to Masury-Young Company.

• Caribbean Blue

"Caribbean Blue," said to be an extremely brilliant silk dye, has been added to the line of textile dyes produced by Hilton-Davis, Cincinnati. Sometimes called Setocyanine (C. I. 663), it was first produced for export to Japan and is now available generally in this country.

• Resigns as Director of PTI Foundation

Emil R. Pohlers, Executive Director of the Philadelphia Textile Institute Foundation in charge of its fund raising, publicity and public relations, has announced his resignation which took effect on May first. Active in textile sales and merchandising since his graduation from the Institute in 1926, Mr. Pohlers plans again to associate himself in the New York market.

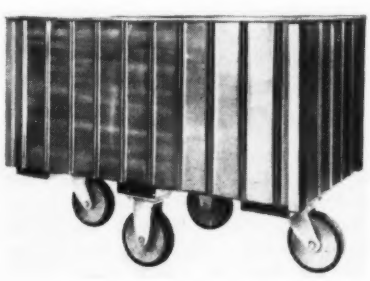
"It has been a great privilege and a satisfaction to me to have a part in the creation of the new Philadelphia Textile Institute, during the past four years," said Mr. Pohlers, "and I look forward to participating in a non-professional capacity in the further development of the School during the coming years with my many friends of the Institute, the Foundation, and the Alumni Association."

The affairs of the Foundation at its new quarters at 3243 School House Lane in Germantown will be conducted by Stuart H. Carroll, who has served as assistant to Mr. Pohlers for the past few years.

• Stainless Steel Trucks

Stainless steel trucks for inter-plant use are now being manufactured in stock sizes by Morris Textile Equipment Co., 99 Lincoln Park, Newark 5, N. J. Available for several years on a custom built basis, the present standardization is the result of careful study of customer requirements. Designed particularly with the needs of the textile industry in mind, it is stated that their durable construction, unique drainage features, corrosion resistance, absence of splinters, ease of cleaning and incapability of absorbing oils, dyestuffs, or corrosive chemicals, should make them applicable to many other industrial uses.

Morris textile trucks are manufactured with stainless steel end, side and bottom panels, having "V" notch corrugations on approximately 6" centers. They are equipped with flush double wall, static



Morris Textile Truck

free, aluminum wheels and casters and rubber tires. Water tight wheels can be furnished as optional equipment for use on trucks carrying wet goods. An unusual feature of the wheels and casters is said to lie in the fact that they are completely thread proof.

• Named to Executive Committee, NETF

The New England Textile Foundation, 68 South Main St., Providence, R. I. has announced recently that R. K. Hubbard, President of Packard Mills, Inc., Webster, Mass.; G. A. McClatchie, President of The United States Finishing Company, Norwich, Conn.; and A. I. Webber, Treasurer of Merrimack Manufacturing Co., Lowell, Mass., were recently elected to the Executive Committee of the Foundation.

Two of the Foundation's annual campaigns have already been completed and were successful. It is now embarked on its Third Campaign, which will last through June and reports that it has already raised more than $127,000.00.

• Joins Springs Mills

Appointment of George C. Ramey to the newly created position of Sales Manager to the Cutting-up Trade, covering all leading cutting-up centers, has been announced by Springs Mills, Inc.

George C. Ramey

Mr. Ramey for the past four years has been director of sales in the New York market and promotion manager of American Cyanamid's Textile Resin Department. He launched such promotions as the shringage control for wool, durable crispness for sheers and wrinkle resistance for cottons.

Mr. Ramey's experience with the promotion of finishes will tie in with the experimental work that is being done on wearability and finishes at the Springs Cotton Mills testing and research laboratories. He left American Cyanamid on June 10 and will join Springs Mills July 1, following a vacation in the South.

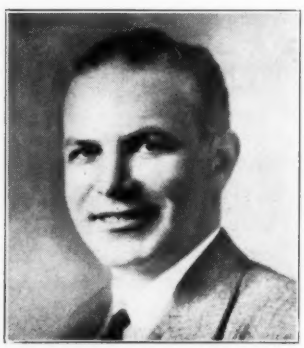
E. E. Routh

S. L. Nevins

• Mathieson Sales Department Changes

Mathieson Chemical Corporation announces changes in its Sales Department Executive Staff as the result of the retirement of E. E. Routh, Vice President, Director of Sales. D. W. Drummond has been named Vice President, Director of Industrial Chemical Sales and S. L. Nevins has been named Vice President, Director of Agricultural Chemical Sales .

All heavy chemicals including sulfuric acid will be handled by the Industrial Chemical Sales Department. All agricultural chemicals which have been added as the result of recent acquisitions of Southern Acid and Sulphur Company and Standard Wholesale Phosphate & Acid Works, Inc., will be under the direction of the Agricultural Chemical Sales Department.



D. W. Drummond

Other appointments are as follows: J. O. Logan becomes Sales Manager, Industrial Chemicals; R. J. Quinn, Assistant Sales Manager, Industrial Chemicals; L. P. Thomas, Southwestern Sales Manager, Industrial Chemicals; J. S. Whittington, Sales Manager, Agricultural Chemicals. Mr. Thomas will be in Houston, Texas, and Mr. Quinn and Mr. Whittington will be in Baltimore, Md. All others will be located in Mathieson's executive offices.

• Berkshire Appointment

Berkshire Color & Chemical Corporation of Springfield, Mass. has announced the appointment of Harold E. Gile as their technical sales representative for northern New England. He has had many years of experience in this field covering the textile and leather industries. Mr. Gile was formerly associated with E. I. duPont de Nemours & Company and more recently with American Aniline Products, Inc.

• Divisional Sales Managers, Westvaco

W. N. Wyatt, previously Division Sales Manager, Westvaco Chemical Division, Food Machinery and Chemical Corporation, New York, in charge of solvents and Magnesol is now Divisional Sales Manager in charge of alkalis and chlorine. Donald C. Oskin, previously in charge of alkalis has been named Divisional Sales Manager in charge of phosphates. Arthur F. Smith, presently Divisional Sales Manager in charge of barium and miscellaneous chemicals will also supervise sales of solvents and Magnesol.

• Process for Paraformaldehyde

Celanese Corporation of America has announced the development of a new process for the large-scale production of low-priced paraformaldehyde in flake form. The announcement opened up the possibility of its use as a replacement for formaldehyde by the plastics industry and other industrial consumers.

It is stated that the development is of particular importance to the thermosetting plastics producers, since it will afford distinctive advantages and efficiencies in reaction, storage, handling and shipping to a degree that may drastically

change present production techniques and costs.

Paraformaldehyde is essentially formaldehyde in a polymerized form, with the difference that it contains less than 10 per cent water as against 63 per cent water in commercial formaldehyde solutions.

Although the new paraformaldehyde is being produced initially as flake, indications are that it will soon be made available in other forms for special applications.

• Production of Cyanuric Chloride

The New Product Department of American Cyanamid Company, 30 Rockefeller Plaza, New York 20, N. Y., announces pilot plant production of cyanuric chloride. A recently issued thirty-page technical bulletin is available upon written request and covers details of physical and chemical characteristics, and uses of this product.

Cyanuric chloride has been used abroad for the preparation of dyestuffs and optical bleaching agents for whitening textiles. The product also offers possibilities for the syntheses of pharmaceuticals, high polymers, explosives, rubber chemicals, mothproofing agents, surface active agents, and plasticizers.

Cyanuric chloride is a solid melting at 146°C. Its boiling point is 190°C., and it is not decomposed at the boiling point. It is hydrolyzed by water, in which it is very slightly soluble. It is soluble in most organic solvents.

Cyanuric chloride is said to possess a high degree of reactivity, somewhat resembling a carboxylic acid chloride and the reactivity of the chlorine atoms differs sufficiently to permit the step-wise introduction of the same or different substituents. Reaction readily occurs with compounds having labile hydrogen atoms, such as amines, alcohols, phenols, mercaptans and malonic esters.

• Birch Brothers Open-Width Processing Machine

Birch Brothers, Inc., announce the introduction of their new Seven Tank Continuous Open Width Machine for processing fabrics in the open width. This machine is of stainless steel construction; the tanks are held in supporting frames; the immersion rolls and steam pipes are of stainless steel. The squeeze rolls are rubber covered, running in roller bearings and the pressure is applied by air cylinders or air motors. Before each pair of squeeze rolls are expander rolls and a spray pipe. The entering end of the machine is fitted with a cloth guider and the delivery end with a folder or a rolling arrangement or both. The drive is by an individual motor for each nip, of the DC soft motor type which is said to insure uniform tension permitting a speed range of 4 to 1.

The machine is used for crabbing fabrics such as gabardine, serges, rayon blends, etc. It may also be used for open width scouring or dyeing. The machine may be had in all widths and any number of tanks.

• Laboratory Service on Curtains

A laboratory service for curtain manufacturers has been announced by Copland Converting & Finishing Company in cooperation with their sales agent, J. W. Valentine Co. This is part of their program which is said to provide manufacturers with rayon, acetate and nylon curtain fabric of tested quality and with the advantages of the most up-to-date finishing developments.

Working in cooperation with the laboratories of the American Cyanamid Company, special formulas have been developed, using Sheerest Resins to produce curtain fabrics that are said to have durable washability, crispness, soot and dust resistance, and immunity to damage from silverfish and other insects. This fabric is known under the trade name Size-Set.

Development of this durable finish for Copland's curtain fabric has been based on the exhaustive laboratory tests of many types of curtain fabrics and has been practically tested not only at the J. W. Valentine-Copland laboratories, but also in the ACC laboratories at Bound Brook.

The laboratory is not limited to testing J. W. Valentine Co. fabrics, it was announced. Fabrics of all sorts will be tested on request by curtain manufacturers who may send samples to J. W. Valentine Co., 40 Worth Street, New York 13, N. Y., for analysis. The laboratory is equipped to analyze fabric, determine construction, grey count and finished count, weight of warp and filling, twist, residual shrinkage after washing, and other similar types of information.

• General Aniline Appointments

General Aniline & Film Corporation announces the following appointments at its General Aniline Works plant at Grasselli, N. J.:

Dr. M. R. Stevinson has been named Production Manager of the Grasselli plant. He is a native of Orrick, Missouri, and received his A.B. degree from Central College, Fayette, Mo., and his Ph.D. from the University of Nebraska. Subsequently he taught chemistry and mathematics at Central College followed by a period as Research Fellow at the University of Nebraska and about one year with Reilly Tar & Chemical Co. Dr. Stevinson was employed by General Aniline in 1935.

L. D. Lytle has been appointed Department Head of Vat Colors at General Aniline Works, Grasselli. He is a native of Pennsylvania and received the degree of Ch.E. from Lehigh University at Bethlehem, Pa. Prior to his employment at General Aniline in 1945, Mr. Lytle was associated with such organizations as Newport Chemical Co., National Aniline and Chemical Co., and Calco Chemical Division.

Dr. Chris C. Schulze has been named Assistant Manager Production (Vats). He was born at Chadron, Nebraska, and received his B.S. degree from the Nebraska State College and his Ph.D. from the University of Iowa. In 1942, Dr. Schulze came to General Aniline with a background of research experience with the National Defense Research Committee.

• Heads Textile Machinery Division

Harmon B. Riehl has been elected Vice-President of Proctor & Schwartz, Inc., and is in charge of the Textile Machinery Division. Since 1943, Mr. Riehl has served as Chief Engineer of this division. He has been with Proctor & Schwartz for the past 34 years, previously working in the Cohoes, N. Y. office and later being Manager of the Boston, Mass. office and reclothing shop. John H. Senior, Vice-President in charge of Textile Machinery Sales, remains in this post.

• Chicago Office, National Aniline

On June 4, 1949, the Chicago Office and Technical Service Laboratory of the National Aniline Division, Allied Chemical & Dye Corporation, formerly located at 357 West Erie Street, Chicago, moved to new quarters, Room 946, The Merchandise Mart, Merchandise Mart Plaza, Chicago 54, Illinois. However, the Chicago Warehouse will continue at its present location, 357 West Erie Street, Chicago.

• Two New Organosols

Two new organosols which are said to greatly simplify the handling of colored organosols in textile coating have

been developed by The Watson-Standard Company, 225 Galveston Ave., Pittsburgh 30, Pa. These two coatings, coded 11-195 and 11-196, are both clear organosols, one high loaded and the other low loaded. It is stated that the Watson-Standard organosols can be used to develop a colored organosol to meet various color specifications without grinding by the addition of small amounts of color paste concentrates. This enables textile coaters to reduce substantially the number of color organosols which they normally keep in stock.

Both Watson-Standard 11-195 and 11-196 are high viscosity organosols. It is stated that the addition of color pastes does not reduce the viscosity, and color organosols derived from them show good "hand" properties, good light resistance and superior durability.

• National Starch Promotions

The promotion of S. F. Thune to sales manager of the Mid-Western Division, National Starch Products, Inc., with headquarters at Chicago has been announced by Chester A. Gage, vice president in charge of sales. Mr. Thune joined National in 1934 upon his graduation as chemical engineer from Worcester Polytechnical Institute. For the past three years he has served as sales manager of the Pacific Coast Division at San Francisco. Prior to that time he spent a number of years as supervisor, Technical Service, for the Mid-Western Division.

Francis R. Loetterle will go to San Francisco as sales manager of the Pacific Coast Division. A chemical engineer, he is a graduate of the University of Nebraska and has served in the Technical Service Department at both New York and Chicago since his graduation in 1940. During the war years he served with the Army in the Chinese Burma theatre where he rose to the rank of Major in the Office of Strategic Services.

S. F. Thune

Francis R. Loetterle

• Cyanamid Sales Meeting

The American Cyanamid Company held a general sales meeting for its Industrial Chemicals Division and its Plastics and Resins Division in Kalamazoo, Michigan, on May 24th and 25th. All mid-western sales and technical representatives for the two divisions involved were in attendance, along with Division and Department Heads from the company's New York Office.

Meetings were held at the Gull Lake Country Club and were under the supervision of Arthur J. Campbell, Division and General Sales Manager of the Industrial Chemicals Division. More than fifty members of the sales and technical staffs of the two divisions were in attendance.

The meetings were devoted to discussions of new and old products marketed by the two divisions, market studies of the mid-western territories and an interchange of information between department heads, technical personnel and men in the field who are in actual contact with customers.

• Dow Appointments

Leland I. Doan, newly elected President of The Dow Chemical Company, has announced the promotion of Donald Williams from General Sales Manager to Director of Sales, the latter position having been vacated by Mr. Doan when he stepped into the presidency on April 5, following the death of Dr. Willard H. Dow in an airplane crash March 31.

Mr. Williams in turn has announced the appointment of Donald K. Ballman, former Assistant General Sales Manager, to fill the position of General Sales Manager and of Dr. L. S. Roehm to the post of Assistant General Sales Manager. Dr. Roehm has been in charge of Dow's Technical Service and Development Division and will continue also in this capacity.

Mr. Williams joined Dow's insecticide sales staff in 1924.

• Joins Brand & Oppenheimer

Philip Oppenheimer has joined the firm of Brand & Oppenheimer, Inc., 229 Fourth Avenue, New York 3, N.Y. He is a son of Harry C. Oppenheimer, President of the organization.

Mr. Oppenheimer received his A.B. in chemistry from Stanford University in 1942 and was associated with Amecco Chemical Co. and Stromberg-Carlson. He served three years in the Signal Corps of the U.S. Army. From 1945 until the present he has been with Heyden Chemical Corp. as a research chemist and later in an executive sales capacity. He is a member of the A.A.T.C.C.

• Expands Phosphate Production

Newark, California has been selected as the site of the new Pacific Coast phosphate operations of the Food Machinery and Chemical Corporation. The plant will adjoin the Magnesium Oxide plant now operated at Newark by the Westvaco Chemical Division.

The new plant is part of the expansion of phosphorus and phosphate production which was announced on March 24 and which involves the construction of a second electric furnace at Pocatello, Idaho, as well as an expansion of the Carteret, N. J. phosphate producing facilities. Construction schedules call for the new facilities to be in operation early in 1950.

• World Trade Program

"World Trade (exporting and importing) is to be a new feature of the Pacific Industrial Conferences, which run concurrently with the Pacific Chemical Exposition at the San Francisco Civic Auditorium November 1-5, 1949," says Leo R. Gardiner, of the California Spray Chemical Corporation, and chairman of the program committee.

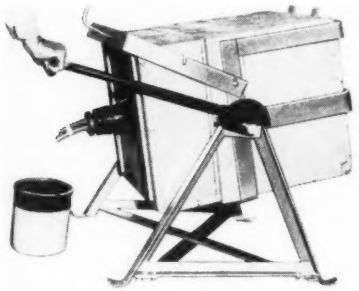
The World Trade program is being organized by Ian Armstrong, Marsman Company of California; H. W. Melander, export manager of Stauffer Chemical Company; and Alvin C. Eichholtz. The first two are members, and the latter is manager, of the World Trade section of the San Francisco Chamber of Commerce.

"The program will be split into two divisions," says Mr. Gardner. "One group of speakers will cover subjects which will appeal to the executives of those companies who have had no experience in the export or import business, but who wish to expand their sales by entering it. The other group will cover subjects which will concern current problems of trade with Pacific Basin countries."

• G-S Carboy Tilter

The new G-S Safety Carboy Tilter with pouring spout, manufactured by General Scientific Equipment Company, 2700 W. Huntingdon Street, Philadelphia 32, Pa., is said to provide a safe, fast and convenient method of draining acids and other liquids from carboys. It fits carboys of any size. The cradle and supporting base are made of structural steel. All members are riveted or welded to insure a strong, durable unit.

It is stated that the locking device permits the carboy to be positively held at any angle for pouring so that the whole operation can be done by one man.



G-S Carboy Tilter

• Azidin Brilliant Bordeaux B, 1%

Rossville Dyestuff Corporation, Arthur Kill Road, Staten Island 13, New York, announces production of Azidin Brilliant Bordeaux B, 1%. The manufacturer claims that this product is fast to light, washing, acid, alkali, ironing and heat. The wash fastness is improved by aftertreating with 3% formaldehyde at 130-140° F. for twenty minutes. It is said to withstand the formaldehyde-urea aftertreatment in which case the light fastness is somewhat improved. It is also said to be quite resistant to water and perspiration. It is stated that it leaves acetate rayon very white and that it discharges to a clear white. It dyes mercerized cotton and rayon the same tone. The manufacturer specifically recommends this color for dyeing men's hosiery, as a ground color for discharge printing, and for acetate rayon mixed goods.

The complete line of dyestuffs produced by this organization includes the following: Direct Garnet B, Azidin Fast Brown BRL, Azidin Fast Red 8BL, Azidin Diazo Red 7BL and Azidin Azurine G.

• Hooker Promotion

William F. George, New York District Sales Supervisor since 1942, has been named New York District Sales Manager for the Hooker Electrochemical Company. Mr. George will continue his headquarters at the New York Office at 60 East 42nd Street. He will devote his efforts to sales management for the downstate New York area, New York City and northern New Jersey. The company has its principal offices at Niagara Falls, N. Y.

Mr. George was at one time connected with Hooker at the Niagara Falls plant and later in the New York sales office. In 1919 he left to organize the firm of W. F. George Chemicals, Inc. which business he conducted until 1928 when he went with *Chemical Industries* magazine.

• Satin Finish for Rayon

Edward J. Capuano, Treasurer of the Newport Finishing Corporation of Fall River, Mass., announces that his firm has introduced a new feature to the rayon finishing industry, with its development of a satin finish for rayon linings. Five years of research and experimentation in Newport's research laboratories are said to be behind the new development. The new finish has been pre-tested, and according to Mr. Capuano, it makes rayon linings look and feel like satin, and gives them nearly all the qualities of a good satin lining.

Samples and information may be obtained from the Newport Finishing Corporation Sales and Showrooms, at 160 Fifth Avenue, New York City.

Book Reviews

Handbook of Chemistry and Physics, 31st Edition

Charles D. Hodgman, Editor; Chemical Rubber Co.; 2756 pages; price $6.00

This indispensable volume of every chemist's laboratory book shelf has appeared again in its thirty-first edition. Its general scope and its very valuable tables are so well known that detailed review is unnecessary, and only the new features will be discussed. A table of logarithms of decimal fractions will be of particular interest of those who have to make logarithmic or semi-logarithmic plots of data involving values less than one; it saves the trouble usually encountered of having to calculate these logarithms from the ordinary tables. A table of the squares of sines and cosines as well as their product will be useful to the mathematician. In the chemical tables and in line with the new interest in atomic structure and nuclear properties, is included a table of isotopic masses; also a very complete table of the lines of the emission spectra of the elements. A table of electronic configuration of the elements replaces one on the orbital arrangement of electrons. If one might make a criticism of the mechanical construction of the volume, it would be that the book is now large enough to be cumbersome to handle and it would be well to use a larger page size to reduce the thickness or else divide the book into two volumes.—J. H. S.

Colloid Chemistry, 2nd Edition, 1949

Harry B. Weiser; John Wiley and Sons, Inc.; 422 pages; 117 figures; price $5.50

This second edition, like the first, is one of our best textbooks of colloid chemistry considered from the theoretical standpoint. After an introductory chapter on the colloidal state, the author then takes up in great detail adsorption, sols, gels, emulsions and foams, aerosols and solid sols. Two important applications—contact catalysis and dyeing—are then discussed. The theoretical sections follow the classical lines of attempting to apply physical-chemical principles to the field of colloids with the ultimate view of developing an equation to express the mechanism of the process under discussion. The section on dyeing—of particular interest to readers of this journal—is unfortunately rather poor. All recent work on the theories and mechanisms of dyeing seem to have been neglected; this is particularly true of the excellent work done in the last six or seven years by the English workers. It is true that we cannot expect complete coverage of every aspect of colloid chemistry from any author, but when he deliberately limits himself to two special fields of applied colloid chemistry, we do expect them to be adequately covered. In spite of this criticism, however, the book is an excellent one on the pure theory of colloids.—J. H. S.

• PATENT DIGEST •

PAUL WENGRAF

Printing Textiles—Photographic Production of Patterns D, 3

Swiss Patent 251,099
(Seligmann-Schuerch, May 18, 1948)

A new attempt for producing printed patterns on textiles by photography is described in the present patent. The principal feature consists of a continuous process carried out by conveying a fabric through a chamber, closed to the outside. The fabric has to pass:

(a) the sensitizing composition (albumen plus silver iodide) placed in (5).

(b) a drying device (8).

(c) the pressure roller (14).

The negative, an endless band, is pressed by rollers (17) against the prepared fabrics while an arc lamp (18) produces the pattern on the textile fabric.

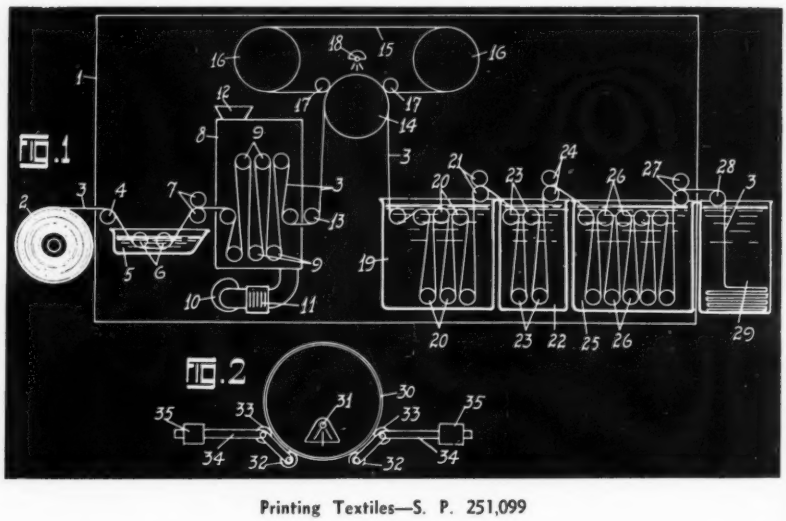
(d) The next step is a developing bath (19).

(e) a rinsing (22) and a

(f) fixing bath (25).

Reference:

Basic information regarding photographic textile printing methods can be found in "Tiba" XIV (9) 621, 1936. Former methods used can be seen in the Philipps British patents (see B. P. 403,001): fabrics are impregnated with sensitized dyes and exposed to light through screens. Compare also with Shiraeff and Jacobs' U. S. Pat. 1,972,323 who proposed padding in a solution of a diazotized base, destroyed by the effect of light rays. A special device and process for photographic textile printing processes has also been described in U. S. Pat. 2,224,365 (Waldrich Co.).

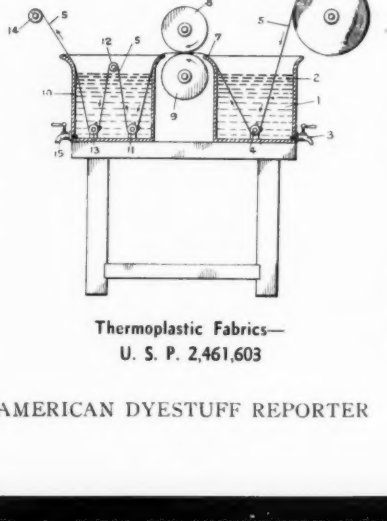


Printing Textiles—S. P. 251,099

Patterned Thermoplastic Fabrics —Local Delustering G, 4

U. S. Pat. 2,461, 603
(Celanese Corp., Hunter-Cramer, February 15, 1949)

Cellulose ester fabrics or fabrics of other thermoplastic material have been produced by employing heat and pressure in passing the goods through embossed calendering rollers. Such fabrics had to be pretreated with plasticizing compounds whereby three-dimensional designs resulted which could not withstand ironing processes and did not drape well because of the stiffening effect of the preparation. The present invention provides a patterned fabric, permanently resistant to washing and cleaning, and having good draping qualities. The method is described as follows: the goods are first impregnated with a swelling agent and conveyed, while still in a swollen condition, between a pair of rollers, one of them being smooth, the other one engraved. The fabric becomes lustrous on the areas where it is subjected to uniform pressure and locally delustered on the engraved areas where no pressure is applied. The bath employed in this process is composed in accordance with the chemical nature of the fiber: for cellulose acetate fibers lower alcohols are suitable swelling agents. Other agents are lower fatty acids or ketones, the latter having also swelling or softening effects for polyvinyl derivatives, as well as halogenated hydrocarbons, etc. Diluted alcohol (33.5-90%) or diluted acetic acid (33-70%) are especially recommended. According to one of the examples 2 p. Celliton Fast Navy Blue B (methylated tetra amino anthraquinone) are dissolved in 68 p.b.w. alcohol and 30 p.b.w. water. A cellulose acetate fabric (5) taken from roll (6) is passed through this solution, contained in vessel (2) partly drained by moving over (7) and then led between engraved roller (9) and smooth roller (8) and washed in vessel (10) filled with water. The effect is said to be durable and to imitate a fabric woven on a jacquard type loom.



Thermoplastic Fabrics—
U. S. P. 2,461,603

References cited by the Patent Office, among others:

U. S. Pat. 1,947,928 (Beck): modifying the acetate cellulose by an alcohol-acetate treatment for dulling purposes.

U. S. Pat. 1,889,061/62 (Celanese): embossing processes are mentioned in the specification which refers to impregnation with plasticizers.

Other reference:

G. P. 623,819 (Growald) suggests to cover knitted goods composed from artificial silk with stencils, to spray the goods thereupon with a swelling agent and to dry in hot air to obtain "moire"-effect.

Printing Device—Screen Printing Table, Combined with Drying Chamber D, 4

U. S. Pat. 2,452,339

(W. F. Uhlig, October 26, 1948)

The apparatus protected by the present patent and illustrated by several drawings has the purpose of printing and drying continuously three or more lengths of a fabric, thus saving space and working without hanging the printed goods on frames as usual. Another advantage is in eliminating the risk of dust or dirt contamination of the printed material by drying it in a closed chamber under controlled atmospheric conditions. Moreover a fastening device (N) is provided to grip the goods firmly and uniformly and a guiding roller (G) to adjust the fabrics in such a position that the filling threads run in an exact rectangle to the warp threads. The material to be printed is pulled across the table as usual, fixed in its position and printed. After a section is printed it is pulled further to advance a fresh section of the fabric while the printed goods are drawn into the drying chamber beneath the table. Two (or even more) sections can be placed in the chamber and then pulled out by roller (K). A drying unit which propels heat under controlled conditions is provided.

References cited by the Patent Office, among others:

U. S. Pat. 2,321,134 (Roto-Matic Screen Printer Ltd.): the well known screen printing machine, characterized by combining a central table, two rollers for unwinding and winding the fabric to be printed on a carrier belt and a special form of a squeegee.

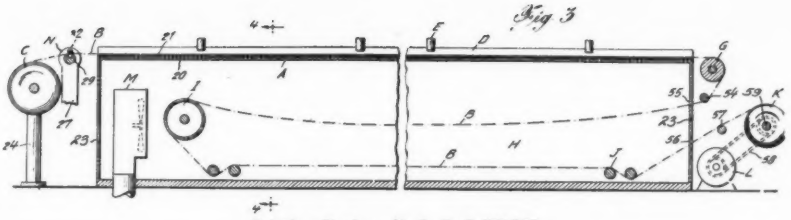
U. S. Pat. 2,235,063 (Bittner): a textile printing frame is described, comprising a pinning mechanism and rubber and brush wheels forcing the selvedges of the cloth on the pins.

Acid Dyes—Dyeing Cellulose by Introducing Amino Groups C, 4, 06

U. S. Pat. 2,459,222

(U. S. Secretary of Agriculture, Guthrie, January 18, 1949)

The methods for increasing the affinity of cellulosic fibers to acid dyestuffs are based on two principles. Either amino compounds such as proteins, albumen or the like, are intimately incorporated in the fiber mass, a method which obviously can only be applied to artificial fibers, or the surface of the fiber has to undergo a chemical combination with a basic nitrogenous radicle. The present invention belonging to the second group suggests subjecting cotton or other cellulosic fibers to a mercerizing process while adding to the alkali lye amino ethyl sulfuric acid



Printing Device—U. S. P. 2,452,339

(ratio for instance 25% NaOH, 65% H_2O, 10% 2-amino ethyl sulfuric acid). The cellulose is wetted with this solution and heated for a longer time (40 minutes up to 9 hours) to 70-110°C, the higher temperatures being used with the shorter treating periods. After completely removing the lye by washing, a Kjeldahl determination of the fibrous product proved that 0.6% N was introduced into the fiber complex which could be dyed very dark and fast with acid dyes. It is assumed that amino ethoxy groups are linked to the cellulose molecule. Dyeing tests have been carried out with Kiton Fast Red B, with Alizarine Blue Black and the like, giving unusually deep shades.

References cited by the Patent Office, among others:

U. S. Pat. 2,340,117 (Celanese): teaches etherifying cellulose by alternatively adding small portions of alkalis and alkylating agents.

U. S. Pat. 2,265,917 (Lilienfeld): cellulose ethers are obtained by reacting cellulose with ethyl chloride in the presence of excess alkali.

Other references are:

U. S. Pat. 2,391,942/1946 (Du Pont): cellulose can be "animalized" by condensing the fibrous material with a tertiary alkylolamine. It is probable that an amido group containing chain is linked to cellulose.

U. S. Pat. 2,261,240/1941 (Duisberg-Esselmann): describes a method for combining cellulose with ethylene imine and carbon disulfide to obtain nitrogenous chemical active groups which can be used for imparting special effects in finishing processes. (connected with this patent are also U. S. Pat. 2,231,890/91 and 2,232,318 of the same authors.)

Water Repellent Fabrics—Higher Aliphatic Acid Peroxides G, 2, 02

U. S. Pat. 2,460,777

(P. J. Gaylor—W. B. Warden, February 1, 1949)

The standard waterproofing processes, for instance the application of metal salts of higher fatty acids in one or two bath methods give products of poor durability. Fabrics treated with organic silicones or for instance with Zelan withstand much better repeated laundering operations but they are relatively expensive, requiring moreover special equipment. The present invention claims to have found a less complicated way for producing durable water repellent finishes. It is suggested to treat the material to be waterproofed with an organic peroxide, having alkyl groups of 10-18 C-atoms. The peroxide, for instance stearoyl peroxide . . . $C_{17}H_{35}\text{-}CO)_2O_2$ . . . is dissolved in trichloroethylene to a concentration of 5-10%. A cotton fabric is dipped in this solution, thoroughly soaked and allowed to stand in the air until the solvent has evaporated whereupon it is placed in an oven and heated to 250°F. The decomposition point of stearoyl peroxide is at 172-176°F, that of lauroyl peroxide at 130-133°F. The principle is to make react the cellulose or other fibrous material with the fatty acid which is set free at the decomposition temperature of the peroxide. Any fibrous material, having free hydroxy or amino groups and being able to react with acids can successfully be treated according to this method. An experiment was carried out with the same peroxide but without decomposing the substance in an oven treatment at the point of decomposition. This sample lost its water repellency after one scouring operation in contradistinction to the oven treated sample.

References cited by the Patent Office, among others:

U. S. Pat. 2,267,276 (Rohm & Haas): in fabrics treated with urea-formaldehyde resins the odor developed in storage can be overcome by a peroxide compound treatment.

U. S. Pat. 2,130,150/1928 (Nathansohn): suggests dipping textiles into solutions of higher fatty acid chlorides or anhydrides in organic solvents, drying and exposing the material to a temperature of 70-100°C. for about 6 hours.

Other references for waterproofing fabrics on a similar base:

U. S. P. 2,270,658 (North Amer. Rayon): the fatty acid anhydrides are applied in the form of a stearyl pyridinium emulsion.

Brit. P. 451,300 (I. G. Farbenind.): higher fatty anhydrides + oleic or other fatty acid are dispersed in soap forming bases.

See also the abstract to U. S. P. 2,411,860 in REPORTER, 1947, 288, regarding waterproofing with higher aliphatic ketones.

Flameproofing—Melamine—Pyrophosphoric Acid Treatment G, 2, 03

U. S. Pat. 2,464,342
(Pollak and Fasal, March 15, 1949)

This patent refers to Pollak's U. S. P. 2,421,218, describing a method for rendering textiles not inflammable and water repellent at the same time by impregnating the material with pyrophosphoric acid, thereafter passing it through a solution of a condensate of melamine and formaldehyde, curing and drying. The effect is based on the formation of melamine pyrophosphate. It is the purpose of the present patent to modify this method, especially to simplify it by conducting the process in one bath, to preserve the mechanical strength, the color and the original touch and to fix the ingredients durably within the fibers. The invention comprises impregnating textiles with a solution of a melamine-formaldehyde condensate and a phosphoric salt of a volatile base such as ammonia, an amine or hydrazine. Preferably the fabrics are passed through pyrophosphoric acid, neutralized by ammonia and thereupon conveyed in a dried or still moist state through an aqueous solution of melamine and formaldehyde. But the pyrophosphate may as well be added to the precondensate which forms with the melamine compound a precipitate either on heating to 100°C. or upon storage. According to an example 126 p. of melamine and 200 p. of commercial formaldehyde, slightly alkalinized, are condensed under reflux. The clear solution is cooled. A concentrated liquid containing 36 p. pyrophosphoric acid is added while cool and neutralized to pH = 7.5. The fabric is padded with this solution, dried and cured at 120-125°C. The fibers are not only flame-resistant but also water-repellent and the melamine-pyrophosphate is firmly incorporated in the fiber so that it cannot be removed by washing. Moreover the textiles proved to be mildewproof.

References cited by the Patent Office, among others:

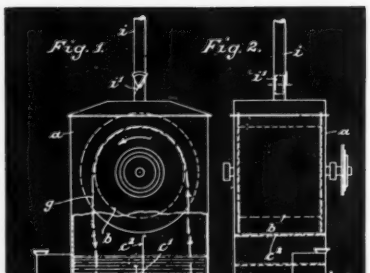
U. S. Pat. 2,339,203/1944 (Am. Cyanamid): methylated methylolmelamine is said to give permanent finishes, a soft springy hand and a fair degree of water repellency.

U. S. Pat. 2,305,035/1942 (Sylvania): flameproofing with alkylolamines and guanidine phosphates.

U. S. Pat. 2,197,357/1940 (Ciba): melamine formaldehyde condensates are used as binders, as crease- and swelling-resistant, fixing, stiffening or softening agents.

U. S. Pat. 2,161,808/1939 (Celanese): creaseproofing by impregnating first with hydrazine or hydroxylamine salts, thereupon with formaldehyde and curing.

Reference is made to "Patent Digest", U. S. P. 2,418,525 (same inventor), REPORTER, 525, 1947.



Dyeing Apparatus—B. P. 602,050

Dyeing Apparatus for Fabrics in Rope Form—Circulating Dyebath C, 6

Brit. P. 602,050
(G. E. Fletcher, June 1948)

The present invention protects a dyeing apparatus which has the following advantages according to the specification: the fabric is less liable to being felted, to be stretched in length and to become uneven in dyeing. Thes objects are said to be attained by a special construction of the heating device preventing direct contact of the fabrics with the heating steam coils or the like (as in other dyeing vat constructions) and by a permanent circulation of the dyeing liquid. Thus the device can be considered as a kind of rope dyeing apparatus, combined with dyeing liquid circulating equipment. The central part of the dyeing vessel (a) contains a casing (c), extending over the whole width of the apparatus, with built-in steam coils (d). The circulation of the dyebath is effected by a pump (f), sucking off the liquid from a point below the working level (i.e. below the lowest point of the rope) and so disposed as to insure an even exhaustion over the full width of the vessel. The liquid is drawn into the casing (c) and warmed here by the coils (d) to the required dyeing temperature. The form of the casing (c) constitutes an essential part of the invention. It can be seen from Fig. 1 that the wall (c^2) is higher than the opposite wall, practically projecting beyond the liquid level. Therefore the dyeing liquid, streaming out of outlet slot (c^1) has a tendency to flow downward, thus in the same sense as the fabric moves on the winch. It is understandable that no substantial felting occurs in this process and that the leveling effect is very satisfactory because the temperature of the dyebath is quite uniform throughout the whole system.

Reference:

Brit. P. 422,825 (White): a piece dyeing machine is described having the following characteristics: the dye vat is partitioned and the dyebath heated in one, the smaller one, of these partitions. The liquid is circulated through a perforated plate, separating the two compartments and brought back by a pump. The heating device is not located in the center of the dye vat as in the present invention but on the side of the vessel. The fabric is likewise dyed in rope form.

Sizing—Starch Blended with "Waxy Starch" A 4, 01

U. S. Pat. 2,462,108
(Stein, Hall & Co., La Piana, February 22, 1949)

This process is characterized by the use of so-called "waxy starch" combined with ordinary corn or tapioca starch or the like. The specification explains that "waxy starch" is a product of the amylopectin type which has been developed from a Chinese waxy corn, brought to this country in 1908 and developed here in long scientific experiments to hybrid corn of special properties in 1942. The product is known in the literature under this name but other similar "waxy starches" ("waxy sorghum"), *not* derived from corn can likewise be used. Ordinary starch sizes become brittle in drying; they have the drawback of congealing in boiled state after some time, clogging the pipes and valves of the equipment. Addition of softening agents is limited in ordinary sizing compositions, because an excess weakens the film surrounding the filament. In contrast thereto blends of the usually applied starch with waxy starches give sizing pastes of a stable viscous condition, non-gelling nor becoming brittle in drying. These films are moreover easily removable. Either one or both components may be modified, i.e., subjected to a dextrinizing action by acid or enzyme hydrolysis or by any known oxidation method, provided that this modification is not carried out to the point of complete saccharification of the components. It is preferred to leave the ordinary starch in the non-modified state and to blend it with modified waxy starch. An example is: a mixture of 50% thick boiling corn starch and 50% of waxy maize starch, hydrolized by acids is suspended in water and boiled. The ratio is about one lb. of starch blend in one gallon of water. The dispersion remains fluid at temperatures of 60-70°F. Obviously this paste can also be used for preparing printing thickeners, finishes and so on.

Reference cited by the Patent Office:

U. S. P. 2,275,845 (Drake): filaments are sized with starches from different sources, for instance, mixtures of above ground starch (wheat or rice) with underground starch (Tapioca, potato starch).

Cellulose Ethers—Dissolved in Sodium Zincate G 2, 01

U. S. Pat. 2,465,520
(Edelstein, March 29, 1949)

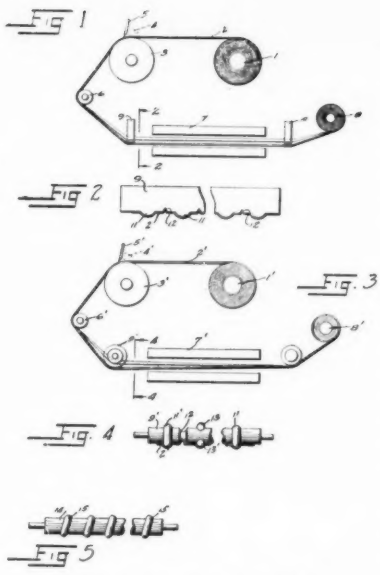
It is known by former patents of this inventor (see U. S. Pat. 2,419,342, REPORTER, 546, 1947; U. S. Pat. 2,442,973, REPORTER, 772, 1948) to use cellulose zincate solutions for sizing, finishing and similar purposes. These solutions have to be prepared quite generally at low temperatures. The same is true for cellulose ether solutions in alkalies which solutions have to be prepared while cooling more or less according to the degree of substitution of the alkoxy groups present in the celullose derivative. It has now been discovered that cellulose ethers can be dissolved in sodium zincate solutions without cooling. Furthermore a relatively high viscosity is obtained despite the fact that zincate is a better solvent for the cellulose ether than alkali hydroxide. This higher viscosity is especially desirable in coating processes where pigments have to be firmly fixed to a fabric, thus giving more stiffness and greater fastness to the finish. It is suggested to slurry first the cellulose ether with water and to introduce thereupon the alkali metal zincate, finally adding the balance water (and in some events ice) for obtaining the viscosity desired. Cooling is not necessary however with the forms of alkyl celluloses which can be dissolved in caustic alkali solutions at 0°C. or above this temperature. Those ethers, asking for minus 15°C or less in using alkali hydroxide as solvent, have to be dissolved at 0°C in zincate. According to an example 6 p. hydroxy ethyl cellulose (degree of substitution, termed "d.s." = 0.5 alkyl groups per glucose unit) is slurried with 20 p. water; 22 p. sodium zincate solution (37% NaOH, 13% ZnO) are stirred in until the ether dissolves and water is added to adjust the total weight to 100. Other examples refer to finishing treatments, carried out with solutions of this type, precipitated on the fiber with acids and optionally followed by a mercerizing procedure which acts on the fabric as well as on the surface layer. By spinning the mass or forming it into sheets filaments or cellophane like structures result.

References cited by the Patent Office, among others:

U. S. Pat. 2,321,270 (Dow Chemical): aqueous emulsions of ether celluloses with alkyl aryl sulfonates (Aresklene).

U. S. Pat. 2,129,708 (Du Pont): sizing preparations from urea-cellulose + aqueous caustic alkali + zincate.

U. S. Pat. 2,036,424 (Eastman Kodak): impregnating textiles by first mercerizing and thereafter applying a cellulose ether solution.



Flocking Device—U. S. P. 2,464,453

Flocking Device—Ornamental Effects by Fixing the Flock in Different Angles D, 3

U. S. Pat. 2,464,453
(United Merchants & Mfrs., Inc., Lindquist, March 15, 1949)

The method is characterized by leading the fabric in a predetermined (undulated) state through an electrostatic flocking unit (7) not especially described nor protected by the present patent. The flock adheres under different angles, which correspond to the undulated form of the cloth, thus forming spots or stripes of greater density. This variation of density causes a two tone effect although the flock is of a single color only. The fabric is led as usual through an adhesive applying device (4), the excess adhesive being removed by the doctor blade (5) and thereupon transported over roll (6) to the pattern jig (9) which is obviously the main feature of this apparatus. It can be seen that projections (11) alternate with notches (12). The flock is applied in the (electrostatic) device (7) and assumes a vertical position. Because of the undulated state of the cloth the parts nearer to the electrode (7) will adhere in greater density than for instance in the parts more remote. This increase and decrease of densities will be repeated over the whole width according to the pattern of the indentations. When the fabric leaves this device and is thereby restored to the flat form, the twofold effect, i.e., changing densities and different angles of the filaments of the flock, will appear as an attractive ombré effect. It is also possible to insert a fluted or otherwise shaped roller (see Fig. 4 and 5) distorting the fabric in various forms instead of the rigid plate (9).

Reference cited by the Patent Office, among others:

U. S. Pat. 2,152,077 (Behr Manning) and 2,217,126 (same company): describe flock printing devices, characterized by applying the flock on a fabric under the influence of electrodes. Many details are given, but apparently no previous undulation or distortion is used for special effects.

Other reference:

Swiss Pat. 182,372 and 182,482 (Baechtold): propose a different way for obtaining similar effects. The fabric to be flock-printed is pressed between patterned calender rollers. The different angles of the flocks applied to these surfaces give special optical effects, imitating pile fabrics. It seems that the relief effect is intended to be durable in this case.

See also for further information the literature mentioned in connection with U. S. P. 2,425,236 (Kenlea Mfg.), REPORTER, 1947, 644 and Brit. P. 573,855 (Freiberg), REPORTER, 1946, 376.

• Felt Association Officers

Cornelius A. Hubner was re-elected president of The Felt Association at the Spring meeting held in New York April 7. Mr. Hubner is president of the Central Felt Company of New York. Stanley M. McNeilly, Bacon Felt Co., Winchester, Mass. was elected vice president of the Association and Herbert S. Blake, Jr., president of Organization Service Corporation was re-elected secretary-treasurer.

For the ensuing year the board of directors is as follows: L. H. Hansel, Felters Company, Boston; John T. Lawless, American Felt Co., Glenville, Conn.; John Newbold, Continental Felt Co., New York; I. Goldberg, National Felt Co., Boston; and Messrs. Hubner and McNeilly.

Headquarters of the Association are 74 Trinity Place, New York 6.

Synthetic Fibers—

(Continued from Page 460)

tics industries, and each benefits from the integration and comparison of this knowledge.

Indeed, knowledge has progressed until readily discernible relationships between the natural materials such as cellulose, silk, wool, rubber and casein and the synthetics, in terms of the size and shape of the molecules of which they are composed, are apparent.

We have learned that in order to have a fiber-forming material you need molecules which are many times longer than they are broad; their lengthwise axis is hundreds and thousands times the width; lit-

erally, their proportions are those of chains not balls or cubes. One requirement then seems to be that the molecular composition be chain-like; it is considered significant that these chains in widely dissimilar materials have some common features.

The differences arise because of different atoms along the chain, because of the effect of side groups attached at regularly spaced intervals versus randomly located groups, because here and there there are rings and loops, and so on; but time does not permit any further consideration of how properties vary as substitutions are made along the chain.

Now, if these chains are too short, fiber formation is difficult or impossible. They must be long enough to be easily lined up. You can make a braid out of the hair on your head but think how hard it would be to braid the stubble you remove when you shave. So, the second requirement is that these chains be long enough. How long is "long enough"? Well, in terms of molecular weight, a water molecule has a unit weight of 18. For fiber formation, you need at least 7000 and upwards. Beyond a certain weight or chain length, you are again in trouble because the viscosity is so high as to resist flow except under extreme pressures.

The third requirement is that the molecules should be such that they do not readily connect across the chains and form 3-dimensional structures which are highly desirable in a plastic, but, for the most part, unwanted in a fiber. There are many other requirements but these are enough to indicate the progress made in recent years.

Having established that we are interested in molecules of a certain size and shape, we are able to concentrate on that kind and pass over the others. And in speculating why a polymer admirably suited for a plastic may sometimes make an interior rubber or fiber, we have been able to learn a great deal about what is needed beyond the requirements I have mentioned. The path has taken us into the field of structure, that is to say, how the chains are fitted together—something about the forces that hold them together —the manner and extent to which they remain in random array and the degree to which they favor those symmetrical arrangements resulting in what we know as crystallinity.

At the other end of the scale, we have studies in progress to establish reproducible and finite relations between fiber and fabric properties. We have tackled the questions of resiliency and what makes wool wool-like. We are trying to get beyond the rough-and-ready definition of a good worsted fabric as one which feels like a calf's ear—soft on the outside but firm under pressure. Those of you who are interested in learning more about this subject, should refer to a paper entitled "A Generalized Concept of Resilience", appearing in *Textile Research Journal* for March 1948, by Dr. R. M. Hoffman, Assistant Director of our Pioneering Research Laboratory. Articles on this subject by other people and other organizations have also been appearing from time to time. In the March 1949 issue of *Papers of the American Association of Textile Technologists*, the results of three years' work on a fundamental study of fabric properties by Dr. E. Vernon Lewis and his colleagues in our Carothers Laboratory, are summarized. The underlying concept was that by having reliable, numerical (objective rather than subjective) data serving to define such intangibles as fabric "hand", technical service for existing yarns, development of new fabrics and the selection of promising new fiber candidates would be greatly facilitated. The latter was perhaps the most urgent of the three.

On the basis of the work reported, we hope that, given sufficiently exact and organized information, it may be possible to weave a prescribed and limited set of fabrics from the candidate yarns, determine quantitatively some key properties of these fabrics, and compare them with the properties of equivalent fabrics made from existing yarns. From such a comparison, we should be able to infer whether the new fiber offers new levels or combinations of desirable properties, or is similar to some existing yarn with which it may be in economic competition.

We are embarked on a broad and complex study. Quite a bit of progress has been made. We now know, better than we did, how much more needs to be learned. If we keep after the fundamentals—the key information—long enough and hard enough, we shall erect a sound structure which will grow and develop every year from now on.

Bonded Fabrics—

(Concluded from Page 454)

tained by dropping steel balls of various sizes on a machined specimen and calculating impact resistance and impact flexural strength according to methods used by Leander and coworkers *(30, 42)*.

The following bonded fabrics are now in commercial production:

TRADENAME	*MANUFACTURER*
Intercel	Celanese Corporation of America
Lantuck	Westpoint Manufacturing Company
Masslinn	Chicopee Manufacturing Company
Miracloth	Nu-Fab Corporation
Mistlon	Minnesota Mining & Manufacturing Co.
Plastavon	Avondale Mills
Steralon	H. H. Frede & Company
Webril	Kendall Mills
Viskon	Visking Corporation
———	Dexter Paper Company
———	The Felters Company
———	Star Woolen Company

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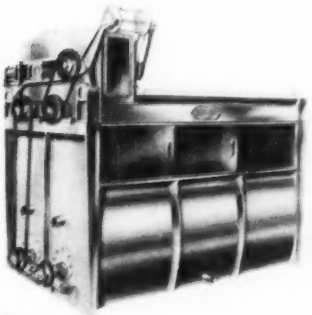
One of a series painted for Rodney Hunt by Ben Stephenson

FAMOUS FINISHES . . *the closest of all the famous races for the America's Cup was in 1901. Sir Thomas Lipton's "Shamrock II" and America's "Columbia" were overlapping at the finish line at Sandy Hook. Because of a 43 seconds handicap, the "Columbia" actually won by 41 seconds after 30 miles and 4½ hours of racing.*

THE "famous finishes" of the Exeter Manufacturing Company on cotton fabrics date back far beyond the earliest races for the America's Cup. One reason for Exeter's reputation is its constant search for better machinery. Exeter was among the first to use the new "Tensitrol" Rope Washer in continuous bleaching. Says its Supervisor of Finishing: "I think it is the best washer to come out since I have been in the business." You are invited to turn the page for more specific information about "Finishing For Profit."



RODNEY HUNT

RODNEY HUNT

Established 1840

ORANGE 10, MASSACHUSETTS, U. S. A.

"Tensitrol," "Tru-Shade," "Slack Loop," "Wring-Master," and "Curve-of-Strength" are registered trade marks identifying textile finishing machinery manufactured exclusively by Rodney Hunt Machine Co.

Finishing For Profit

RODNEY HUNT

Established 1840

RODNEY HUNT MACHINE CO.

ORANGE 10, MASSACHUSETTS, U.S.A.

Story of a "Tensitrol" Washer

THIS "Tensitrol" Rope Washer left the Rodney Hunt plant by truck one Saturday morning.

Sunday afternoon it is all set up and operating in the mill.

On Monday at 7 a.m. it goes into full production as a caustic washer in a continuous bleaching range.

First test: to determine the efficiency of the counterflow of water:

Station No. 1 — Where cloth enters machine.
Station No. 2 — 1/3 distance through machine.
Station No. 3 — 2/3 distance through machine.
Station No. 4 — Where cloth leaves machine.

Caustic content in the water at stations above:

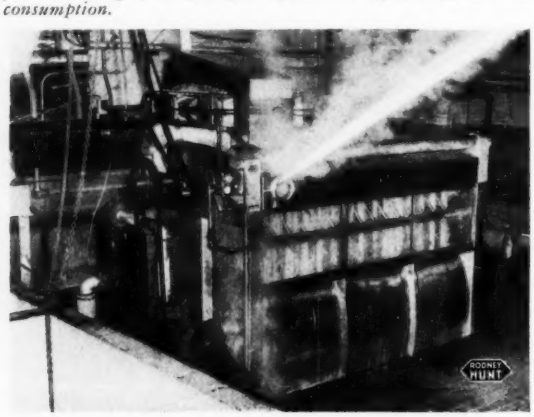
Station No. 1 — 0.188%
Station No. 2 — 0.056%
Station No. 3 — 0.012%
Station No. 4 — 0.0004%

Conclusion: *Excellent efficiency of counterflow.*

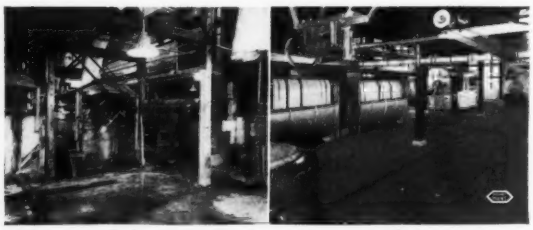
Second test: to determine washing efficiency. The "Tensitrol" Rope Washer versus two Tight Strand Washers, as used for caustic washing in bleach range.

Caustic Wash	*2 Tight Strand Washers*	*1 "Tensitrol"*
Average speed	200 YPM	200 YPM
Water used	300 gal. per min.	80 gal. per min.
Horsepower	40 HP	20 HP
Floor space	225 Sq. Ft.	50 Sq. Ft.
Caustic content leaving machine	0.03% NaOH	0.008% NaOH

Conclusion: *In efficiency of wash—one "Tensitrol" Rope Washer equals eight Tight Strand Washers. Saving of 50% in horsepower. Saving of 80% in floor space. Saving of 70% in water consumption.*



"Tru-Shades" Pay for Themselves In Two Years!



Before *After*

IN two years, according to this mill owner, he got back his investment on six modern Rodney Hunt "Tru-Shade" Dye Kettles.

How? The six "Tru-Shades" replaced 12 wooden machines which resulted in lower power costs, less handling, fewer seconds, and less floor space. The big saving, however, was in labor due to the ease of changing from dark to light shades.

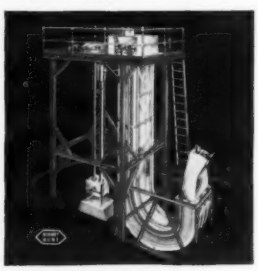
In addition, the owner got rid of tangles and tension and his dyeing is now uniform. A pleasing dividend in quality.

"Tru-Shades" eliminate the No. 1 bugaboo of stainless fabrication — bulging and flexing. Their patented "Curve-of-Strength" construction provides a tub formed precisely to the correct arc to balance the weight of the dye liquor.

Is it any wonder that more "Tru-Shades" are in use today than all other stainless steel dye machines combined?

★ ★ ★

No Weak Links In Highest Speed Bleaching Range



THERE should be no "weak links" in your new complete Bleaching Range. In making such a major investment, it is important to make sure that no single piece of the equipment detracts from the performance of the whole. A production break-down can be costly indeed.

Each machine in the Range must be dependable, designed right and built right for years of productive service. That is why Rodney Hunt's more than 100 years of specialization and leadership in wet finishing equipment are so important. Rodney Hunt has pioneered most of the major improvements in Washers, Saturators, Wringers and J-Boxes.

Drive and control equipment is nearly as important as the machines themselves. Here again, Rodney Hunt's experience can help. They supply complete "packaged" units—including all machines, accessories, drive and control equipment. This means that one company — Rodney Hunt — will assume all responsibility for the satisfactory operation of your *complete* range.

Rodney Hunt is today installing several complete Bleaching Ranges to be run at 300 yards per minute — *the highest speed ranges in existence!*

★ ★ ★

If further information is desired on the above subjects, please address your inquiries to the Rodney Hunt Machine Co., Orange 10, Massachusetts, U.S.A.

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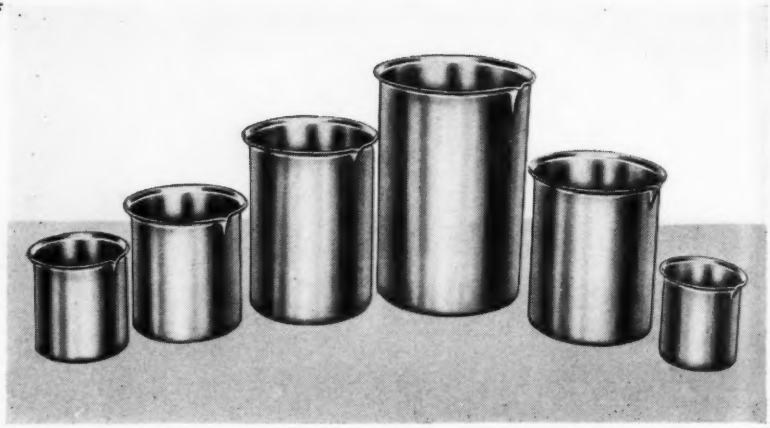

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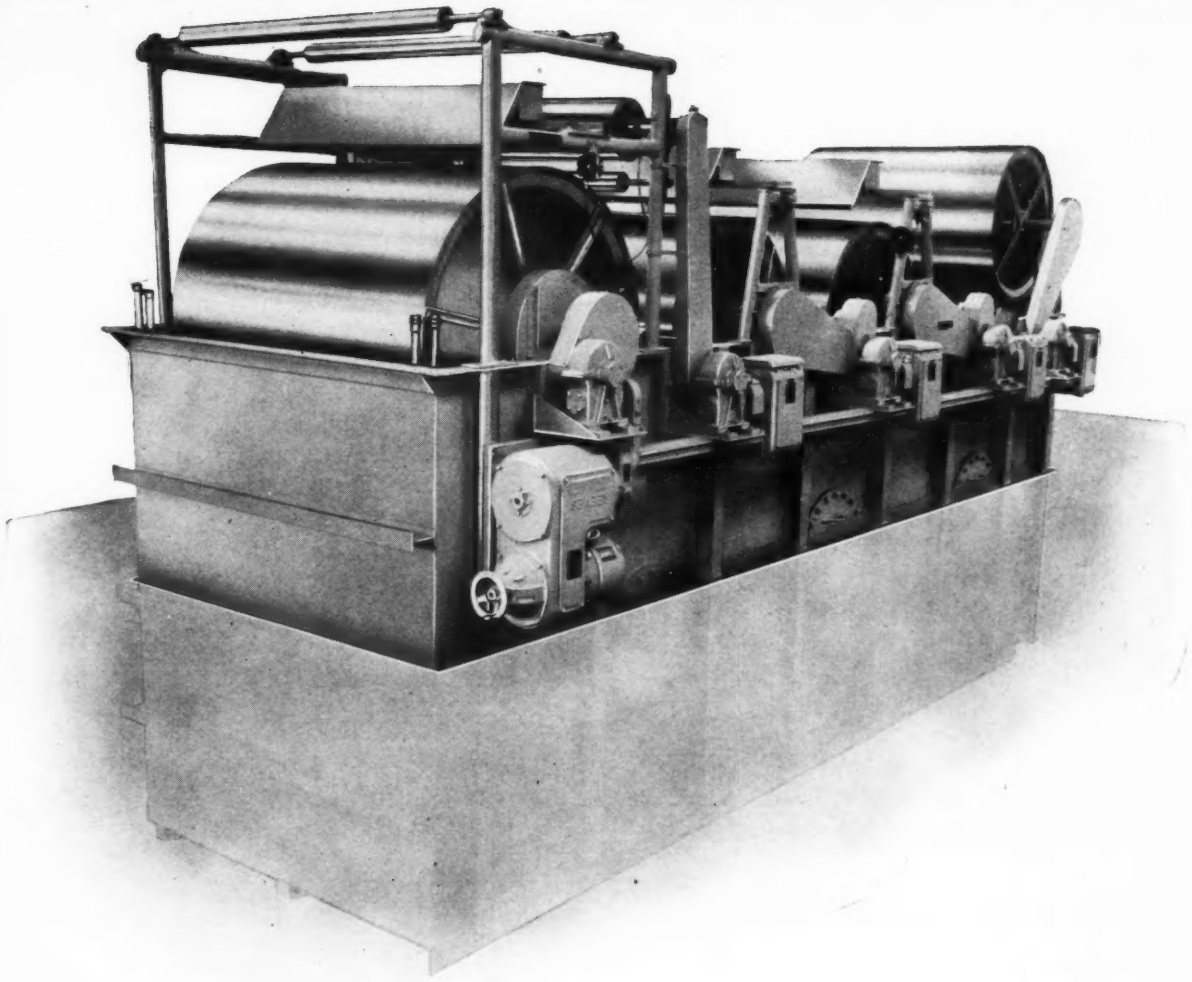

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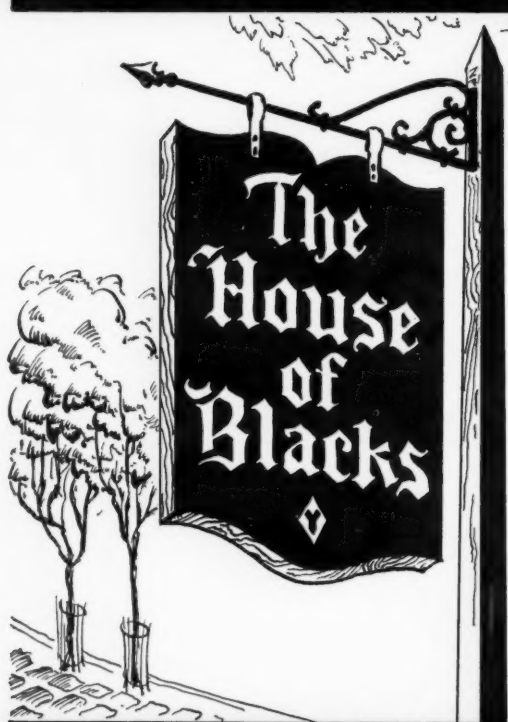

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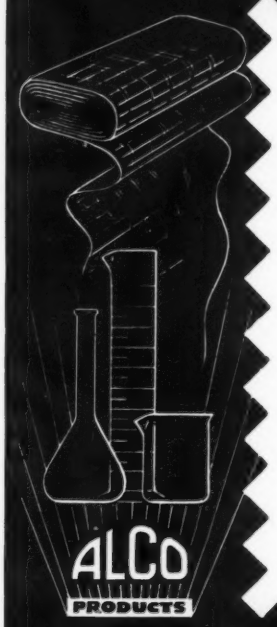

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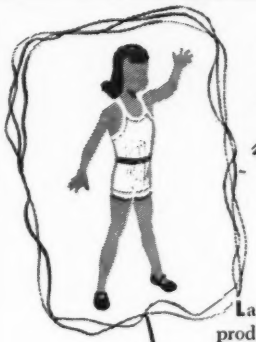

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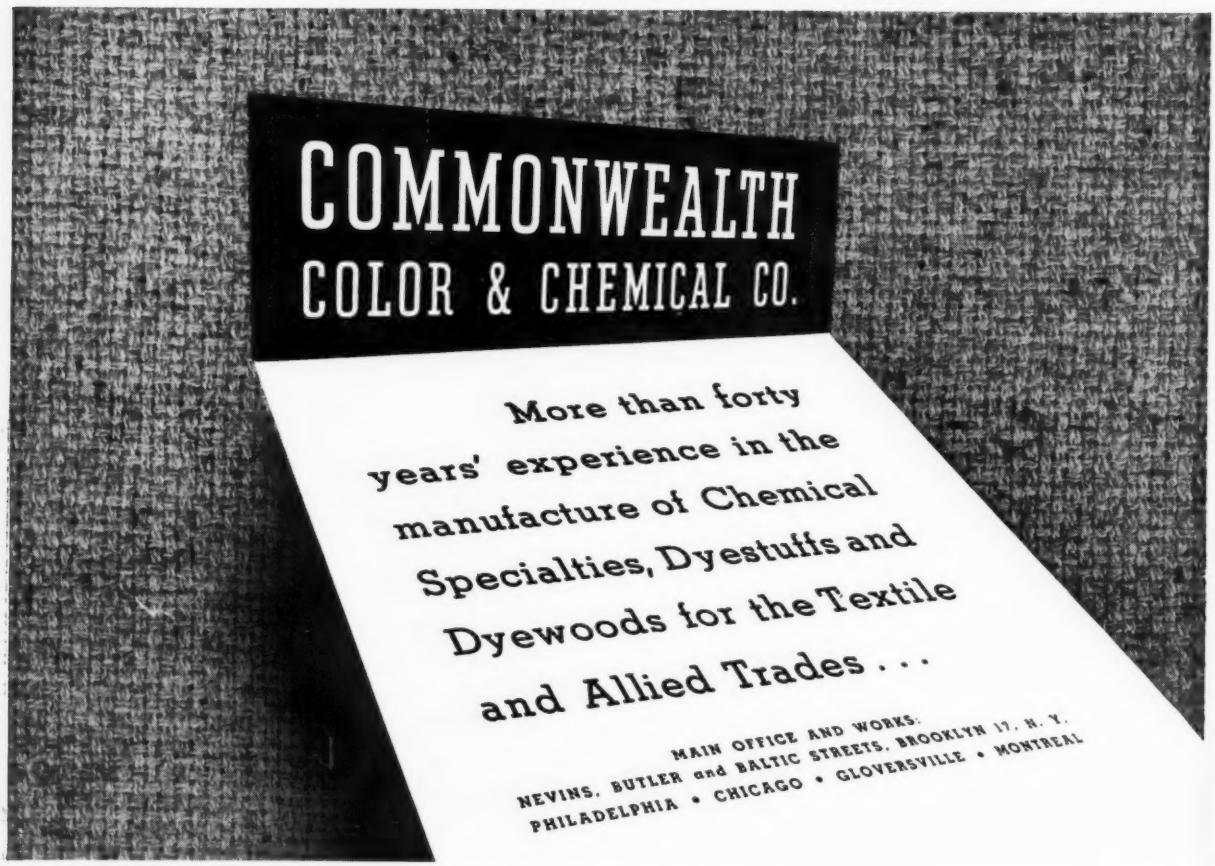
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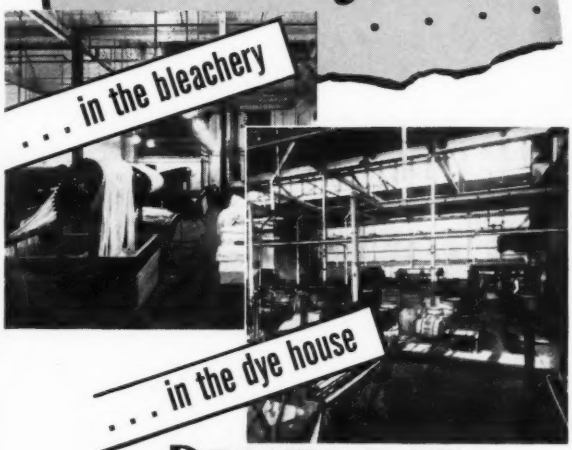

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• CLASSIFIED ADVERTISEMENTS •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery wanted or for sale—the rate is $7.50 per column inch or less per insertion.

FINISHER WANTED: Nationally known textile organization in South wants a qualified finisher who has had experience on flat goods and underwear crepe. Man should have very sound synthetic fabric background. Please write giving full particulars on experience, background and some indication of salary desired. Write Box No. 599.

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POSITION WANTED: Textile Chemist, Age. 29, broad experience in wet processing and dyeing of cottons and rayons. Formerly in charge of laboratory and dyehouse of well known organization. Superintendent material. Write Box No. 635.

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Recommended for producing fast shades on Ladies' Dress Goods, Carpet Yarn and Upholstery Materials.

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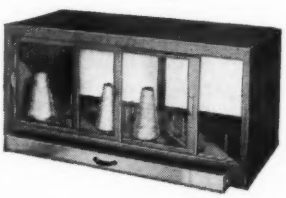

You can be sure of these important advantages when you use moistening boxes made by Joseph Amon, Inc., of Rahway, N. J. Your yarns will never be damaged by rust stains...there will be less danger of tangling during moisturizing and storage...you will get controllable humidification.

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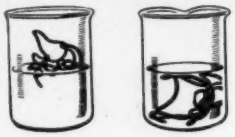

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